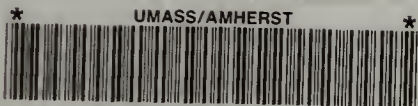


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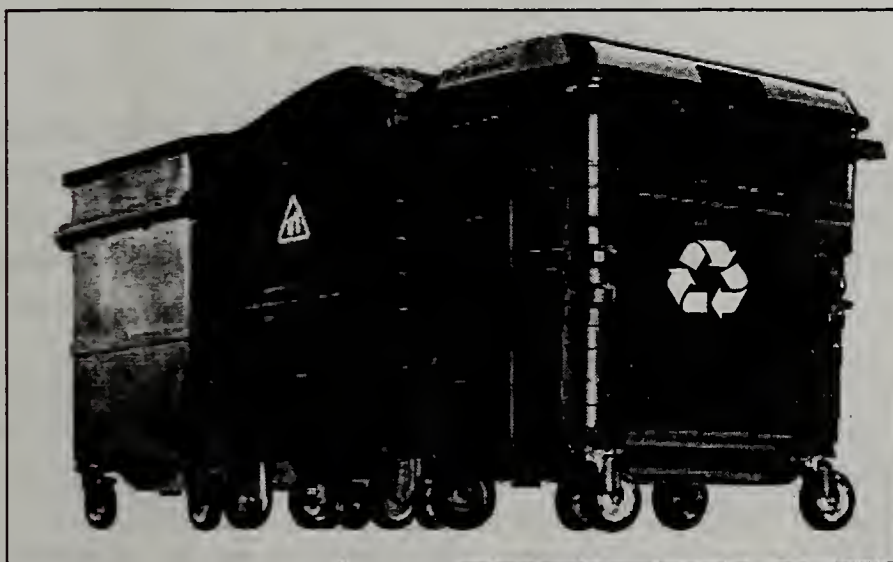
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**Draft**

**June 23, 2000**

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# **Beyond 2000 Solid Waste Master Plan**



## **A Policy Framework**



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Executive Office of Environmental Affairs  
Massachusetts Department of Environmental Protection

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COMMONWEALTH OF MASSACHUSETTS  
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

MARGARETO PAUL CELLUCCI  
Governor

BOB DURAND  
Secretary

JANE SWIFT  
Lieutenant Governor

LAUREN A. LISS  
Commissioner

June 23, 2000

Dear Citizen:

I am pleased to present the *Draft Beyond 2000 Solid Waste Master Plan – A Policy Framework* for your review and comment. The *Draft 2000 Plan* proposes the Commonwealth's long term goals for solid waste management and basic policies for waste reduction, recycling, and disposal for the next decade. Public hearings on this plan are scheduled around the state in July, as described in the attached Public Hearing Notice. The comment period will run through August 4, 2000.

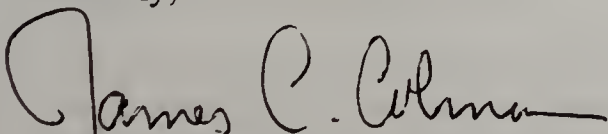
Our vision for the coming decade is one where we continually work to reduce the quantity and toxicity of our waste to the maximum feasible extent, so that we dispose of the least amount of waste as possible. This is a long-term vision that calls for significant changes in the behavior of the public and private sectors and even changes in how goods are produced. Adopting this vision is critical if we are to protect public health and the environment and move toward a more sustainable future.

The social and economic changes needed for maximizing waste reduction will require strong partnerships between the public and private sectors. Residents, businesses, institutions, and government must take increased responsibility for reducing, reusing, and recycling waste. The waste industry must fully embrace waste reduction as its core business and ensure that all recyclables are recovered and only the smallest amount of waste is disposed. Manufacturers also must change their role by taking more responsibility for the products they produce so that they contain less toxics, create less waste, and are easier to recycle.

The *Draft 2000 Plan* moves us very strongly in the direction we need to go and presents a realistic timeframe for achieving key milestones. It lays out strategies for increasing source reduction and recycling, and for reducing the use of toxic chemicals in products over the next ten years. At the same time, it also proposes a strategy to ensure that the trash that cannot be reduced or recycled is disposed of in environmentally sound ways.

I encourage you to provide us with your comments on this proposal at the public hearings and in written comments. The *Beyond 2000 Master Plan* will affect us all, so your advice will be crucial if we are to prepare a final plan that adequately meets the waste management challenges we face as we enter the next decade.

Sincerely,



James C. Colman  
Assistant Commissioner

\*This information is available in alternate format by calling our ADA Coordinator at (617) 574-6872.

DEP on the World Wide Web: <http://www.state.ma.us/dep>



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Commissioner

**NOTICE OF PUBLIC HEARING  
PROPOSED BEYOND 2000 SOLID WASTE MASTER PLAN**

Notice is hereby given that the Department of Environmental Protection (DEP) will hold public hearings on the *Draft Beyond 2000 Solid Waste Master Plan – A Policy Framework*. DEP has prepared this *Draft Plan* in accordance with Massachusetts General Laws, Chapter 16, §21. The *Draft Plan* proposes the Commonwealth's long term goals for solid waste management and basic policies for waste reduction, recycling, and disposal for the next decade.

DEP will conduct public information sessions to explain key components of the *Draft Plan* prior to the start of the public hearings. The information sessions and public hearings will be held on the following dates:

Monday, July 17, 2000; DEP Southeast Regional Office, 20 Riverside Drive, Lakeville, MA;  
Information session: 6:30 pm - 7:30 pm; Public hearing: 7:30 pm

Tuesday, July 18, 2000; DEP Northeast Regional Office, 205 Lowell Street, Wilmington, MA;  
Information session: 6:30 pm - 7:30 pm; Public hearing: 7:30 pm

Wednesday, July 19, 2000; DEP Western Regional Office, 436 Dwight Street, 3d Floor "Court Room", Springfield, MA;  
Information session: 6:30 pm - 7:30 pm; Public hearing: 7:30 pm

Thursday, July 20, 2000; DEP Central Regional Office, 627 Main Street, Worcester, MA;  
Information session: 6:30 pm - 7:30 pm; Public hearing: 7:30 pm

Friday, July 21, 2000; 21<sup>st</sup> Floor, McCormick State Office Building, One Ashburton Place, Boston, MA;  
Information session: 9:00 am - 10:00 am; Public hearing: 10:00 am

Testimony may be presented orally or in writing at the public hearings. Written testimony will also be accepted until 5:00 pm on August 4, 2000. Written testimony should be submitted to:

Glenn Keith  
Department of Environmental Protection  
Bureau of Waste Prevention  
One Winter Street  
Boston, MA 02108  
Email: [master.plan@state.ma.us](mailto:master.plan@state.ma.us)

Copies of the *Draft Plan* may be obtained by calling Kimberly Ihrig at 617-292-5961. Copies are also available at each of the DEP Regional Service Centers and at the DEP InfoLine in the DEP Boston Office (1 Winter Street, 2<sup>nd</sup> Floor). The *Draft Plan* also is available on DEP's Web Site at <http://www.state.ma.us/dep/bwp/dswm/dswmpubs.htm>

This information is available in alternate format by calling our ADA Coordinator at (617) 574-6872.

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## Executive Summary

### Introduction

The Year 2000 marks the end of a decade of managing solid waste in Massachusetts under the *1990 Solid Waste Master Plan* and its *Updates*. In the last ten years, Massachusetts has made tremendous progress in reducing, reusing, and recycling its waste. We have also worked to ensure that those wastes that are not reused or recycled are disposed of in the most environmentally safe manner possible.

Since 1990, we have reduced waste disposal by an estimated 40 million tons, avoiding the need to build ten 1,500 ton-per-day landfills or combustors. In 1998, our municipal solid waste recycling rate stood at 36%, more than triple the rate in 1990. We have seen the provision of comprehensive recycling services expand to 85% of our population, and have seen tremendous growth in the Massachusetts recycling industry, creating new jobs and adding to the health of our economy and our environment. We have also kept significant quantities of toxic materials from improper disposal through hazardous household product collection programs and have adopted the most stringent mercury emission limits in the nation for our municipal waste combustors. Finally, we have closed more than 100 unlined landfills that posed potential threats to our groundwater resources. These actions have helped to preserve and sustain the quality of all of our communities.

As we enter the 21<sup>st</sup> Century, it is time to update our integrated solid waste management strategy to move us closer to our goal of generating and disposing of as little waste as possible. This *Beyond 2000 Solid Waste Master Plan – A Policy Framework* charts our course for the next ten years by providing an overarching policy framework for managing solid waste in the Commonwealth that will lead to a more sustainable future.

### Vision and Key Policies

The vision we adopt in this *Plan* is one where we continually work to reduce the quantity and toxicity of our waste to the maximum feasible extent, so that we dispose of the least amount of waste as possible. In many ways, the job we face is not different from in the past – we must reduce the amount of waste produced, reuse and recycle as much as possible, take out the toxics, and dispose of what is left in a way that protects public health and the environment.

However, to go beyond the progress we have already made, we must embrace sustainability principles which require us to generate less waste and to view discarded material that has served one purpose not as waste, but as a resource for another purpose. This will require us all to take greater responsibility in managing our resources. All of us who produce waste - whether government, institutions, businesses, or citizens - must take greater responsibility for reducing, reusing, and recycling our waste. The waste industry must fully embrace waste reduction services to ensure that all recyclables are recovered and only the smallest amount of waste is disposed. Manufacturers must take greater responsibility for the products and packaging they produce that unnecessarily and too often end up as waste.

Increasing our ability to reduce waste is a wise investment that will greatly benefit the Commonwealth. Reducing waste generation and increasing recovery of useful materials will add to our economy and promote greater sustainability in our communities, conserve land and natural resources, and result in the need for fewer landfills and combustion facilities with their potentially adverse impacts.

This *Plan* includes a number of key policies and initiatives that will help us achieve our vision over the next ten years:

- **Waste Reduction Milestones** – increase waste reduction capacity and establish new waste reduction milestones that account for source reduction, recycling, and toxicity reduction. By 2010:
  - ❑ Achieve 70% waste reduction of municipal solid waste (MSW) and construction and demolition (C&D) debris (60% MSW waste reduction and 88% C&D waste reduction).
  - ❑ Substantially reduce the use and toxicity of hazardous products and provide convenient hazardous product collection services to all residents and very small quantity hazardous waste generators.
- **Source Reduction** – place a greater emphasis on reducing waste generation by expanding source reduction programs, especially targeted at businesses.
- **Product Stewardship** - launch a new initiative with manufacturers to encourage, and in some cases require, them to share in the responsibility for managing the products they produce with the goal of reducing and eliminating toxics and waste.
- **Multi-family Recycling Legislation** – pursue legislation requiring that residents in multi-family units be provided with access to recycling.
- **Unprocessed C&D Waste Ban** – increase recycling of C&D debris by banning the disposal of unprocessed C&D in 2003.
- **Enhanced Waste Ban Enforcement** – hire additional staff to ensure compliance and enforcement of waste bans.
- **Recycling Benefits Plans** – require disposal facilities to implement Recycling Benefits Plans as a way to increase their role in ensuring recovery of recyclables from the waste stream.
- **Improved Facility Safeguards** – issue revised site assignment regulations to provide increased protection of sensitive receptors from solid waste facilities and revise landfill design standards to require all new landfill cells to use a double liner system with leak detection.
- **Disposal Capacity Schedule** – phase in needed disposal capacity on a set schedule to allow time for waste reduction to increase and to prevent overbuilding of capacity.



## **Need for Increased Integrated Waste Management Capacity**

Since 1988, Massachusetts has maintained a policy that encourages the state to maintain enough waste management capacity to meet its own needs. This policy has limited waste disposal capacity to the amount of waste generated within the state that is not recycled, so that on balance we should be neither a net importer nor a net exporter of trash. This *Plan* re-affirms this policy, recognizing that we should take responsibility for managing our own solid waste. Providing for our own waste management needs makes sense from both an environmental and economic perspective. Exporting waste does not avoid the potential adverse impacts of disposal, but only changes the location where these impacts occur and creates additional impacts from increased transportation. Exporting of wastes also means losses in revenues from recyclables recovery.

Currently, our management system is out of balance and Massachusetts is a net exporter of trash. To meet our goal of no net import or export, we must increase our waste management capacity. This increase in capacity must be done in a way that supports our vision of maximum waste reduction. Therefore, our first priority in addressing our waste management need is to increase our ability to reduce and recycle our waste. This *Plan* lays out a waste reduction strategy that will meet the majority of the waste management need in Massachusetts with additional waste reduction capacity.

## **Waste Reduction Strategy**

Our waste reduction strategy reaffirms the overall waste management hierarchy established in 1990:

- reduce the amount and toxicity of waste produced,
- recycle the maximum amount of waste that is produced,
- as a last resort, properly dispose of waste that is not recycled.

Note, however, that we are proposing one change to the hierarchy: we will no longer maintain a preference for waste combustion with energy recovery over landfilling. Instead, we will view both disposal options on the same footing: options of last resort that have potentially adverse impacts that should be addressed on a facility-by-facility basis.

## **Source Reduction**

To meet our vision of reducing waste disposal, we must place a greater emphasis than we have in the past on preventing waste in the first place. Source reduction is the most environmentally preferable and potentially least costly alternative to waste management. Wastes not generated in the first place do not need to be managed, and therefore the costs and impacts of waste management are avoided altogether. Source reduction also includes reuse of materials, which has less environmental impacts than recycling. This *Plan* lays out a strategy that will lead individuals, businesses, and government to take the steps necessary to reduce the amount of waste generated. Key components of our strategy include:

- Use the Product Stewardship Initiative to decrease the amount of packaging for products and provide more reuse opportunities.

- Increase backyard composting of yard, food, and paper waste.
- Promote Pay-As-You-Throw municipal trash programs.
- Promote material exchange networks and other opportunities for reuse of products.
- Promote source reduction concepts in building design and construction.
- Provide education and technical assistance to consumers and businesses on how they can reduce the amount of waste they generate.

## **Toxicity Reduction**

A second but equally important strategy is to reduce the toxicity of waste that is disposed. Many of the products that people routinely throw in the trash contain some toxics. A small amount of toxic material can go a long way in contaminating the environment. Therefore, we must ensure that products contain fewer toxics and that those which do contain toxics are removed from the waste stream for recycling or proper disposal. Key components of our strategy include:

- Use the Product Stewardship Initiative to reduce toxics in products and packaging and ensure proper post-consumer collection and recycling / reuse.
- Pursue key toxics reduction legislation (toxics in consumer products, mercury product stewardship, used oil recycling, Environmental Stewardship Initiative).
- Expand our Hazardous Products collection efforts (including convenient collection programs, local and regional permanent collection centers, promotion of Environmentally Preferable Products programs).
- Implement the Material Separation Plans for the Municipal Waste Combustors.
- Ensure that Recycling Benefits Plans include provisions for the separation of toxic products from the waste stream.
- Implement the Regional Mercury Action Plan (including work with the health care industry to reduce toxics, promoting mercury bearing products collection, and pursuing mercury labeling/take back legislation).

## **Recycling**

Finally, our strategy includes continuing to increase the recycling of useful materials. Many materials that can be recycled are currently being disposed, resulting in lost economic and environmental protection benefits. This practice is not sustainable in the long run, and so stronger actions are needed to ensure recovery of recyclable materials. The goal of our recycling efforts must be to ensure that all waste is processed for the removal of recyclables prior to disposal. Key components of our strategy include:

- Use the Product Stewardship Initiative to increase the recyclability of products and packaging.
- Pursue legislation requiring that residents in multi-family units be provided with access to recycling.
- Work with the waste industry to increase the Commonwealth's recycling infrastructure through Recycling Benefits Plans.
- Enhance enforcement of waste bans.
- Promote Pay As You Throw municipal trash programs.



- Continue to provide grants, incentives, and other assistance to municipalities for recycling programs.
- Increase efforts to expand sustainable markets for recyclables.
- Implement a statewide recycling education campaign to increase awareness of the benefits of recycling.
- Provide recycling education and technical assistance to businesses and the construction industry.
- Ban disposal of unprocessed C&D in 2003.
- Continue to support increases in Clean Environment Fund spending on recycling programs and work to eliminate provisions that limit spending flexibility.

## **Waste Disposal Capacity**

Our capacity projections indicate that, even if we increase our waste reduction capacity to meet our milestones, we will still need to permit additional disposal capacity to meet our no net import / no net export goal. This disposal capacity is primarily replacement capacity needed due to the closing of unlined landfills and the closing of the Lawrence and Fall River combustors due to more stringent air emission limits. In permitting this capacity, we will continue to ensure the protection of health and the environment and promote an integrated approach to waste management that emphasizes waste reduction.

Key components to our permitting strategy include:

- Requiring disposal facilities to implement Recycling Benefits Plans that lead them to take aggressive actions to increase source reduction, toxicity reduction, and recycling.
- Increasing waste ban enforcement to keep recyclable materials from being disposed.
- Increasing protection of public health and the environment from solid waste facilities by:
  - Issuing final revised facility siting criteria that provide increased protection for sensitive receptors and resources.
  - Revising the landfill design standards to require a double liner system with leak detection for all new disposal cells.
- Phasing in disposal capacity on a yearly schedule to meet our no net import / no net export goal no earlier than 2006.

Together, these actions will support our primary goal of increasing waste reduction to the maximum extent possible.

## **Non-MSW Waste Streams**

Municipal solid waste (MSW) has historically been the primary focus of state and local planning efforts. However, the inter-relationship between the management of MSW and other non-municipal solid wastes (non-MSW) requires that we look holistically at our entire waste stream to ensure that our planning for specific waste streams takes into account effects on other waste streams. In particular, this *Plan* recognizes the important relationship between landfill capacity and the management of non-MSW materials (such as construction and demolition debris, contaminated soils, and dredge materials), and starts the process to better account for these materials and plan for their responsible management.



# Chapter One: Introduction

## Purpose

The Department of Environmental Protection (DEP) has issued this *Draft Beyond 2000 Solid Waste Master Plan – A Policy Framework* in accordance with Massachusetts General Laws, Chapter 16, §21, which requires DEP to develop and maintain a comprehensive statewide master plan for solid waste management. Upon its finalization, this *Plan* will supersede all previous Solid Waste Master Plans, Plan Updates and amendments.

This *Plan* provides a broad, overarching policy framework for managing solid waste in the Commonwealth for the next ten years and establishes milestones for measuring progress. On an annual basis, DEP will develop specific program plans for implementing the strategies outlined here, and will gather and analyze information on solid waste generation, waste reduction, and disposal. DEP will track progress in meeting waste reduction milestones and will report each year by early summer on progress achieved during the previous year. DEP will provide this information to and confer with the Solid Waste Advisory Committee and other program stakeholders on a regular basis. As needed, DEP will revise the policy framework in this *Plan* based on the performance of the solid waste management system and input from program stakeholders.

## Vision

The vision we adopt in this *Plan* is one where we continually work to reduce the quantity and toxicity of our waste to the maximum extent possible, so that we dispose of the least amount of waste as possible.

To achieve this vision, we must place a greater emphasis than we have in the past on preventing waste in the first place. Source reduction is the most environmentally preferable and potentially least costly alternative to waste management. Wastes not generated in the first place do not need to be managed, and therefore the impacts and costs of waste management are avoided altogether. We must also get the toxics out of our waste stream by reducing the toxics in products and packaging and by providing for the collection of those hazardous products that are produced. Finally, we must continually increase the amount of materials that we recover from the waste stream so that only an irreducible minimum is sent for disposal.

Increasing our capacity to reduce waste is a wise investment that will greatly benefit the Commonwealth. Reducing waste generation and increasing recovery of useful materials will add to our economy and promote greater sustainability in our communities, conserve land and natural resources, and result in the need for fewer landfills and combustion facilities with their potentially adverse impacts.

We recognize that while striving to achieve maximum waste reduction and minimum waste disposal, technological and economic barriers must be considered. However, with the commitment of the residents of the Commonwealth, municipalities, businesses, and the waste



industry, we believe we can find creative and cost-effective ways to overcome these barriers in order to better protect quality of life and the environment.

We also recognize that, while working toward maximum waste reduction, we must take responsibility for managing waste that is not reduced or recycled. This can be done by providing, as a last resort, disposal capacity for these wastes in a manner that does not endanger public health or the environment and that provides incentives to reduce and recycle waste.

## Background

In 1990, the Executive Office of Environmental Affairs (EOEA) and DEP published the *1990 Solid Waste Master Plan*, laying out a ten-year strategy for managing the Commonwealth's solid waste. The *1990 Plan* established an integrated waste management hierarchy favoring source reduction, followed by recycling, and then disposal as a last resort with a preference for waste-to-energy combustion over landfilling. It also set the following state-wide goals for how municipal solid waste (MSW) was to be managed by the year 2000:

- 10% is source reduced (this would keep the amount of MSW generated each year level despite growth in the economy and the population).
- For MSW that is generated:
  - ⇒ 46% is recycled,
  - ⇒ 50% is combusted with energy recovery,
  - ⇒ 4% is landfilled,
- The toxicity of waste is significantly reduced through the removal of household hazardous products prior to disposal.

Under the *1990 Plan*, the Commonwealth has maintained an overall solid waste disposal policy that limits disposal capacity to disposal need within the state (meaning that there should be no net import or net export of waste). This policy is designed to protect the environment from the adverse effects of solid waste disposal while at the same time recognizing that the state has a responsibility to manage the waste its citizens and businesses produce.

Since the *1990 Plan*, there have been three comprehensive *Plan Updates* (1994, 1995, and 1997) and a 1999 Amendment to the *1997 Update*. These documents provided updated solid waste system information and laid out steps for implementing the policies and programs needed to achieve the goals set in 1990.

Figures 1-1 and 1-2 below show the annual amount of MSW and non-MSW (respectively) generated in Massachusetts from 1990 through 1998, and how it was managed. Solid waste accounted for includes MSW (typical trash from households and businesses), and non-MSW - primarily construction and demolition debris, but also smaller amounts of sludge, non-hazardous industrial solid waste, and other wastes. In 1998, 48% of all waste generated was diverted from disposal to recycling.<sup>1</sup>

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<sup>1</sup> Includes estimates of backyard composting.

Figure 1-1: How MSW Was Managed 1990-1998

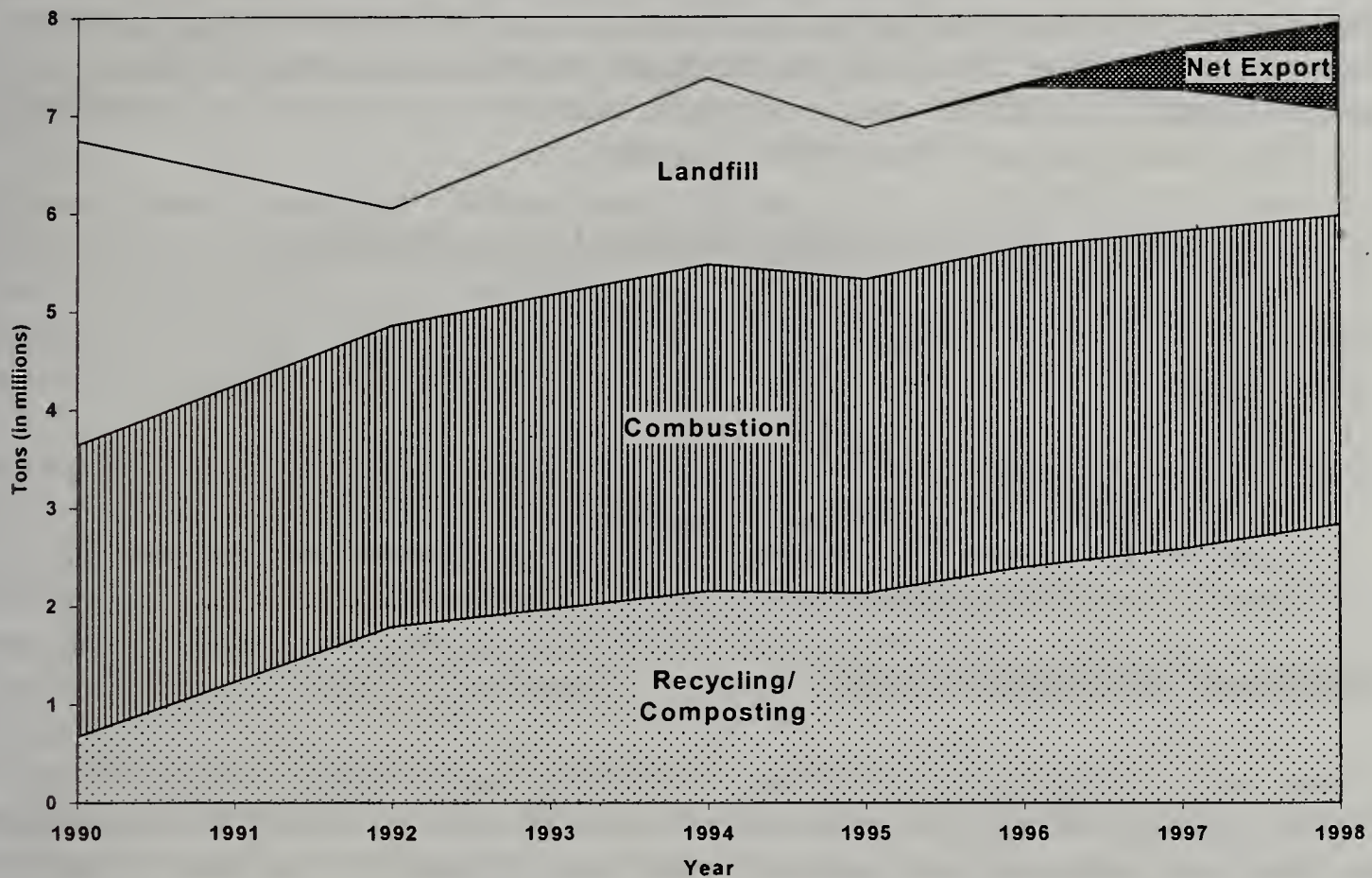
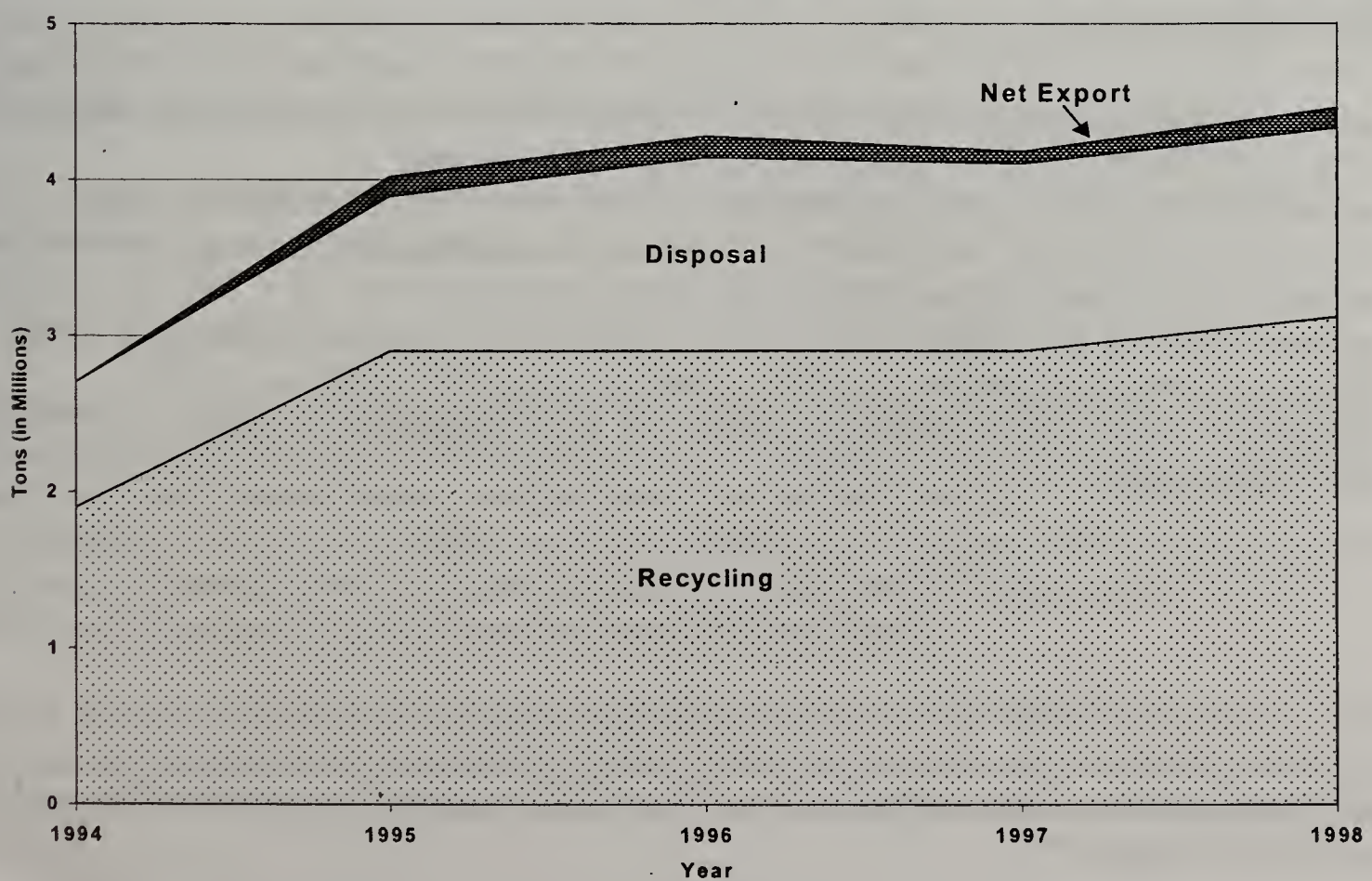


Figure 1-2: How Non-MSW Was Managed 1994-1998





Massachusetts has clearly made tremendous progress in meeting the goals of the *1990 Master Plan*. However, due to the robust economy, the generation of waste has increased faster than expected, and while the amount of waste recycled has increased each year, it has not kept pace with increases in generation. As a result, Massachusetts no longer has enough in-state management capacity to handle its waste - net exports amounted to just over 1 million tons of MSW in 1998, which represents 11% of MSW generated.

**Table 1-1: Where are We Relative to the 2000 Goals?**

|                                                          | 1990 | 1998               | 2000 Goals |
|----------------------------------------------------------|------|--------------------|------------|
| <b>Recycled</b>                                          | 10%  | 36%                | 46%        |
| <b>Combusted</b>                                         | 44%  | 40%                | 50%        |
| <b>Landfilled</b>                                        | 46%  | 13%                | 4%         |
| <b>Net Import <sup>(-)</sup> / Export <sup>(+)</sup></b> | *    | 11% <sup>(+)</sup> | 0%         |

Note: Recycled includes estimates of backyard composting.

\* Data not available. Between 1990 and 1994, Massachusetts was an overall net importer of solid waste. Massachusetts has been a net exporter of solid waste since 1995.

## The Importance of Waste Reduction

The primary policy underpinning of this *Plan* is that Massachusetts should minimize disposal by reducing the quantity and toxicity of waste generated. There are many benefits to our quality of life that result from waste reduction. Increased waste reduction results in less waste disposal, which means the need for fewer landfills and combustion facilities with their potentially adverse impacts. Manufacturing with recycled materials is far less costly to the environment in natural resource and energy consumption. Recycling also creates jobs and conserves natural resources. To illustrate just some of these benefits, the MSW diverted from disposal in Massachusetts in 1998 is estimated<sup>2</sup> to have:

- reduced greenhouse gas emissions by 754,753 tons of carbon equivalent per year, equal to 13% of all industrial carbon dioxide emissions in Massachusetts;
- saved 24.2 trillion BTUs of energy, enough to power nearly 130,000 homes for a year;
- reduced air pollutants by more than 70,000 tons and water pollutants by nearly 8,000 tons (in addition to the greenhouse gas emissions mentioned above);
- reduced emissions of nitrogen oxides by about 7,400 tons and reduced emissions of sulfur oxides, an important ingredient in acid rain formation, by about 6,000 tons; and
- reduced the need to mine 520,000 tons of iron ore, nearly 300,000 tons of coal, and 25,000 tons of limestone.

<sup>2</sup> Source: "Estimating the Environmental Impacts of Recycling: A Spreadsheet Estimation Model", Northeast Recycling Council, August 1999.



## Key Challenges

Solid waste management has changed in significant ways since the publication of the *1990 Master Plan*, and new conditions present new challenges to achieving our vision of reducing the quantity and toxicity of our waste to the maximum extent possible. Key challenges that we face include:

**Increasing waste generation** – Massachusetts and the nation as a whole have experienced a prolonged period of economic expansion. A good economy means growth in per capita waste generation due to increased purchasing of goods. While major source reduction and recycling efforts have diverted significant quantities of waste from disposal, the amount of waste requiring disposal has continued to increase.

**Slowing growth in recycling** – Many states, including Massachusetts, have found that they are not likely to meet their ambitious Year 2000 recycling goals. The fact that citizens, municipalities, and many businesses have embraced recycling as a way to protect the environment has resulted in tremendous gains. However, much of the easier initial gains have been made and further recycling increases are becoming more difficult, requiring a renewed and concerted effort by the public, government, business, and the waste industry to push recycling higher.

**Resistance to change** – Our vision of maximum waste reduction calls for significant changes in the behavior of the public and private sectors and even changes in how goods are produced. The social and economic changes needed for achieving this vision are not easy to make, and will require strong partnerships between the public and private sectors. Residents, businesses, institutions, and government must take increased responsibility for reducing, reusing, and recycling waste. The waste industry must fully embrace waste reduction as its core business, ensuring that all recyclables are recovered and only the smallest amount of waste is disposed. Manufacturers also must change their role by taking more responsibility for the products they produce so that they contain less toxics, create less waste, and are easier to recycle.

**New products with toxics** – Each year, new products enter the marketplace that contain toxic materials, posing new waste management challenges. Through the Product Stewardship Initiative, our goal is to become proactive in addressing toxics by working with product designers and manufacturers rather than simply reacting to new products with toxics.

**Difficulty in siting solid waste facilities** – Siting any type of solid waste handling facility in Massachusetts is becoming increasingly difficult. The siting process for disposal capacity is costly and controversial, raising questions about whether there will be enough additional management capacity to meet state needs. Our strategy is to increase waste reduction to lower the need for disposal sites. To do this, additional organics and C&D processing / transfer facilities will be needed, which have their own siting challenges.

**Effect of decreasing landfill capacity on the management of non-MSW materials** – C&D is the primary component in the non-MSW waste stream and has been accounted for in past planning efforts. However, there are a number of other non-MSW waste streams and materials

in Massachusetts that have not been fully accounted for but which rely heavily on landfills for their management. For example, the majority of oil and other slightly contaminated soils removed through cleanups governed by the state's Waste Site Cleanup Program go to landfills as alternative daily cover, grading and shaping materials, or engineered capping material. C&D fines, which are a residual byproduct of C&D recycling, are also dependent on use at landfills as daily cover. As the number of landfills diminish, outlets for these materials are becoming scarcer. The reduction of cost-effective management options could adversely affect cleanups, brownfield developments, and C&D recycling, which are activities the Commonwealth seeks to promote.



## **Chapter Two: Waste Reduction Strategy**

Our vision to reduce the quantity and toxicity of our waste to the maximum extent possible calls for a strong waste reduction strategy. The three key components of this strategy are: source reduction; toxicity reduction; and recycling.

First, we must place a greater emphasis than we have in the past on preventing waste from being generated. Source reduction is the most environmentally preferable and potentially least costly alternative to waste management. Wastes not generated in the first place do not need to be managed, and therefore the costs and impacts of waste management are avoided altogether.

Second, we must ensure that products contain fewer toxics and that those which do contain toxics are removed from the waste stream for recycling or proper disposal. Many of the products that people routinely throw in the trash contain some toxics. A small amount of toxic material can go a long way in contaminating the environment. Toxicity reduction greatly improves our ability to manage wastes that are generated in an environmentally safe manner.

Finally, we must continue to increase the recycling of useful materials. Many materials that can be recycled are currently being disposed, resulting in lost economic and environmental protection benefits. This practice is not sustainable in the long run, and so stronger actions are needed to ensure recovery of recyclable materials. The goal of our recycling efforts must be to ensure that all waste is processed for the removal of recyclables prior to disposal.

To measure progress for implementing our waste reduction strategy, we are setting new milestones. By 2010:

- Achieve 70% waste reduction of municipal solid waste and construction and demolition debris (60% MSW waste reduction and 88% C&D waste reduction).
- Substantially reduce the use and toxicity of hazardous products and provide convenient hazardous product collection services to all residents and very small quantity hazardous waste generators.

Our waste reduction strategy will include a number of new initiatives as well as continuation of existing programs. Two key initiatives that are closely tied to the role solid waste facilities will play are Recycling Benefits Plans and enhanced waste ban enforcement. These initiatives are described in Chapter 5 in our permitting strategy. The other components of our waste reduction strategy are described below.

### **Product Stewardship Initiative**

The task of reducing waste is a big one. But if we address the issues we face together, we will find new and innovative ways to meet our goals to reduce the toxicity and amount of waste, and to increase recycling. One major way we can meet the challenge before us is by launching a new initiative with manufacturers to encourage and, in some cases, require them to share in the responsibility for managing the products they produce. These efforts, being led by the Executive



Office of Environmental Affairs (EOEA), will contribute to each of the components of our waste reduction strategy, including source reduction, toxicity reduction, and recycling.

Product Stewardship can best be defined as a product life cycle where all parties responsible for the design, production, sale, and use of a product assume responsibility for the full environmental impacts of the product throughout its life cycle.<sup>1</sup> Environmental impacts of products considered include air and water pollution, energy use, product and packaging waste, and worker and consumer safety. Solutions to reduce these impacts require the cooperation of product designers and manufacturers, suppliers and distributors, retailers, and consumers.

Product Stewardship efforts have already begun in Massachusetts. EOEA has worked with the rechargeable battery industry to start a battery recycling program, developed used oil recycling legislation with the petroleum industry, and is currently involved in a surplus paint take back program with Benjamin Moore, which has a Massachusetts manufacturing location. Other local manufacturers have also expressed an interest in working to develop joint solutions to waste problems.

EOEA's Product Stewardship Initiative will explore with selected manufacturers ways to share in the management of products all along the product's life cycle. While this effort primarily will be voluntary in nature, EOEA has, at times, taken a proactive stance on issues of major importance. For example, DEP has issued municipal waste combustor regulations that require facility owners to assist the state in developing programs to collect and recycle or dispose of products containing mercury prior to combustion. EOEA has also supported state legislation that would require manufacturers to share responsibility with the state, the combustion industry, and other stakeholders in ensuring that mercury-containing products, such as button batteries, thermostats, thermometers, electrical switches, and fluorescent lamps, are not thrown in the garbage.

The next steps of EOEA's Product Stewardship Initiative include developing a Massachusetts Product Stewardship Policy; developing Product Stewardship Action Plans for key products, such as thermometers, thermostats, carpet, paint, and electronics; and supporting regional and national product stewardship initiatives. EOEA has also taken a lead role working with other states to develop a national consensus on the product stewardship roles to be played by government and industry.

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<sup>1</sup> Solid Waste Policy Report, Minnesota Office of Environmental Assistance, January 2000, p. 45.

## Source Reduction Strategy

The most environmentally preferable strategy for reducing waste disposal is to prevent waste from being produced in the first place. Source reduction prevents the consumption of natural resources and reduces the burden on the recycling and waste disposal infrastructure. Source reduction refers to the design, manufacture, purchase, or use of materials to reduce the quantity generated and/or the toxicity of materials before they enter the solid waste management system. This includes redesigning products or packaging to reduce the quantity or the toxicity of materials used, reusing products or packaging already manufactured, and lengthening the life of products to postpone disposal. While source reduction refers to both volume *and* toxicity reduction of solid waste, this section focuses primarily on volume reduction (see the next section for Toxicity Reduction.)

Communities and businesses throughout the country are already implementing source reduction programs, many of which have contributed significantly to solid waste management efforts. Prominent examples in the residential sector include grass-cycling (i.e., leaving grass clippings on lawns), home composting of food and yard waste, and clothing reuse. In the commercial sector, examples include newspaper light-weighting (i.e., using less material), packaging redesign, pallet reuse, and electronic document storage.

Over the past 10 years, major state and municipal programs contributing to source reduction in Massachusetts have included programs promoting backyard composting, adoption of Pay-as-You-Throw (PAYT) programs, household hazardous product collection, electronics collection and reuse, technical assistance to help businesses reduce their waste generation, product stewardship efforts (e.g., manufacturer rechargeable battery take back), and the use of state procurement specifications that promote reuse and waste/toxicity reduction.

## Source Reduction Goals and Objectives

The goal of our source reduction strategy is to reduce the environmental and public health impacts that arise from the extraction, manufacture, distribution, use and disposal of materials. Specific objectives include:

1. Increase source reduction<sup>2</sup> to support our 60% MSW and 88% C&D waste reduction milestones.
2. Promote source reduction education and awareness among businesses, government, and consumers.
3. Decrease the toxicity of materials entering the waste stream (see the next section on Toxicity Reduction).
4. Develop the capacity to better measure, evaluate, and communicate progress in source reduction.

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<sup>2</sup> Source reduction amounts can be counted as the difference between potential waste generation and actual waste generation. See Chapter 3 for a more detailed explanation.



## Source Reduction Programs

Key programs in our source reduction strategy include:

- Implement EOEPA's Product Stewardship Initiative.
  - ❑ Work with manufacturers to promote less packaging in products and more reuse opportunities.
  - ❑ Support voluntary agreements and actions promoting take-back, reuse and waste reduction.
  - ❑ Support state, regional and national product stewardship initiatives.
- Promote C&D reuse and source reduction.
  - ❑ Create a source reduction guide for contractors.
  - ❑ Sponsor waste prevention training for residential and commercial building contractors.
  - ❑ Integrate source reduction strategies into state government building designs/specifications.
  - ❑ Expand existing efforts to promote exchange of building materials between contractors and homeowners.
  - ❑ Revise beneficial use determination regulations to facilitate reuse of C&D materials.
  - ❑ Encourage municipalities to reduce building permit fees or provide other incentives for contractors that implement satisfactory reuse strategies.
  - ❑ Promote source reduction concepts in building design.
  - ❑ Seek to incorporate source reduction into projects undergoing Massachusetts Environmental Policy Act (MEPA) review.
- Promote Pay-As-You-Throw (PAYT) programs throughout the state.
  - ❑ Provide financial incentives for municipalities transitioning to PAYT.
  - ❑ Expand workshops and outreach materials on PAYT.
- Expand on-site composting programs and reuse for yard, paper and food waste.
  - ❑ Conduct a statewide public education campaign targeting organic wastes.
  - ❑ Promote rebate programs with manufacturers and distributors of mulching lawn mowers.
  - ❑ Promote food banks as a way to keep surplus food out of the waste stream.
  - ❑ Conduct intensive compost bin distribution and education programs for composting in PAYT communities.
  - ❑ Promote environmentally preferable landscaping strategies (such as use of native species) to reduce organic by-products.
  - ❑ Provide consumer education grants to municipalities.
- Promote material exchanges and reuse networks targeting building materials, industrial waste, household materials and electronic equipment.
  - ❑ Provide technical assistance including training and networking.
  - ❑ Provide equipment grants to reuse organizations (for trucks, facilities, computers).
  - ❑ Develop an inventory of reuse organizations and services for dissemination via the DEP web site and other means.
  - ❑ Conduct pilot projects to identify best outreach and transportation practices.
  - ❑ Provide consumer education grants to municipalities.

- Conduct a multi-sector paper reduction campaign (targeting the production of fewer catalogs, phone books, junk mail, and office paper).
  - ❑ Conduct municipal pilot programs targeting catalogs, junk mail, and phone book reduction.
  - ❑ Work with regional and national organizations to develop agreements with direct mail companies to reduce mailing weight and frequency, use recycled paper, and replace paper catalogs with online catalogs.
  - ❑ Promote the development and use of innovative technologies to enable electronic document storage and transmission as alternatives to paper.
  - ❑ Develop a pilot project to obtain a 25% reduction in the use of paper at DEP and other EOEAs.
  - ❑ Promote paper waste reduction initiatives in key sectors (e.g., financial, insurance, legal), through technical assistance and performance recognition.
- Enhance business source reduction technical assistance and policies.
  - ❑ Encourage source reduction through the Environmental Stewardship Program currently under development by EOEAs.
  - ❑ Support waste audit programs that integrate solid waste source reduction with energy and water efficiency programs.
  - ❑ Sponsor waste reduction awards and contests.
  - ❑ Integrate source reduction initiatives into other business assistance programs conducted by agencies, organizations or utilities.
  - ❑ Support industrial waste exchange programs and eco-industrial parks.
- Conduct source reduction education programs that focus on consumer purchasing practices, backyard composting, and reuse opportunities.
  - ❑ Provide municipal education grants to support smart purchasing campaigns.
  - ❑ Develop an interactive web site with source reduction ideas and reuse opportunities for communities.
  - ❑ Develop partnerships with agencies, utilities, and businesses to incorporate source reduction concepts in their promotional materials.
- Promote state procurement specifications that facilitate source reduction, including leasing and take-back strategies, lightweighting, packaging elimination, bulk packaging, and longer warranties.

## **Toxicity Reduction Strategy**

Many of the products that people routinely throw in the trash contain some toxics, such as mercury, lead, organic solvents and cadmium. They end up in a landfill or incinerator, where, even with increasingly stringent pollution controls, toxic chemicals and metals may leach into groundwater or escape into the air. Nationwide, consumers are growing more aware of the environmental and health consequences of using and disposing of hazardous products that are routinely generated at home or at businesses. A small amount of toxic material can go a long way towards contaminating the environment. Therefore, it is important to ensure that products



contain fewer toxics, and that those products that do contain toxics are removed from the waste stream.

Over the past decade, the state has focused on reducing the toxicity of waste by removing hazardous household products prior to disposal. While continuing these efforts, our strategy must focus more on decreasing the production and purchase of products containing toxics, which is the most effective way to reduce toxicity in the waste stream.

Massachusetts programs to reduce the toxicity of the waste stream have served as a model around the country for their cost-effective approach and their focus on priority materials. In 1996, EOEPA, in conjunction with DEP and the Office of Technical Assistance, issued the *Massachusetts Plan for Managing Hazardous Materials from Households and Small Businesses* (The HHP Plan). This document presented a framework for household hazardous products (HHP) management focusing on the overall goals of protecting human health and the environment by reducing the toxicity of the waste stream and conserving valuable resources in leftover HHPs. This was to be accomplished mainly by collection of materials at the local level through a phased approach.

The HHP Plan grouped materials into three categories: high volume materials (such as paints and automotive products), Universal Wastes<sup>3</sup>, and low volume materials (such as solvent-based glues, photographic chemicals, etc.). This framework has guided the state's efforts to promote permanent local HHP collection programs that increase access to HHP collection services for the high volume and Universal Waste materials which were often not included in past collection initiatives.

Under the HHP Plan, DEP has supplied 85 used motor oil collection tanks, as well as wooden sheds and flammable material cabinets for surplus paint collection programs in over 80 locations throughout the state. Over the past few years, DEP has provided technical assistance and funding to communities setting up innovative HHP programs, such as mercury-bearing waste collections. In FY98, DEP gave a \$164,000 grant to an eight-community regional group to establish a permanent HHP collection facility based in Lexington that also takes low volume materials. In addition, DEP added sheds for the collection of mercury-bearing waste to the grant program in FY99.

Much progress has been made in implementing the HHP Plan, particularly for the collection of paint, oil and universal wastes. Building on this foundation and the experience gained in recent years, DEP plans to enhance efforts to increase access to comprehensive HHP collection services (including low volume materials) for residents and for very small quantity generators (VSQGs) of hazardous wastes. VSQGs may include municipal and state agencies, schools, public works departments, and small businesses that have universal wastes and small amounts of waste chemicals, but have typically not been served by municipal collection programs.

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<sup>3</sup> The U.S. Environmental Protection Agency, in its Universal Waste Rule (URule) of May 1995, reduced the management requirements for certain "universal" wastes previously subject to full hazardous waste requirements so that better environmental protection could be achieved at lower cost. The items include batteries (primarily nickel cadmium and button batteries), thermostats, fluorescent lamps, and pesticides.

**Table 2-1: Categorization of Hazardous Product Materials**

| <b>Category</b>           | <b>Product</b>                                                                                                                           | <b>Examples of Hazardous Components</b>                                                       |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| High Volume Materials     | Paints, rust remover, furniture strippers, motor oil, oil filters, anti-freeze, automotive batteries, household batteries, disinfectants | Acetone, xylene, toluene, ethylene glycol, lead, benzene, petroleum distillates, glycol ether |
| Universal Waste Materials | Button cell and nickel-cadmium batteries, mercury thermostats, pesticides, fluorescent lamps                                             | Sulfuric acid, lead, cadmium, mercury, organo phosphates, malathion, carbal, anilazine        |
| Low volume materials      | solvent-based glues, photographic chemicals, aerosol spray cleaners, pool chemicals, lime fertilizer                                     | Acrylamide, acrylic acid, chlorobenzene, perc, aniline, munitic acid, calcium oxide           |

Source: *Massachusetts Plan for Managing Hazardous Materials from Households and Small Businesses* and the Massachusetts Water Resources Authority.

Many communities have HHP collection events every year. However, one quarter of the communities in the state have not conducted a collection event in over six years. Residents of communities that offer annual HHP events do not necessarily have access to collection services when they need them (e.g., when residents are moving or doing spring or fall cleaning). DEP receives phone calls on a regular basis from citizens looking for a safe place to dispose of their hazardous products. In fact, there is an increasing problem of abandoned hazardous products at public works yards and recycling centers. DEP plans to address this need through increased initiatives aimed at toxicity reduction throughout the state and by expanding the current focus to include general "hazardous products" encompassing those generated by small businesses as well as by households.

## **Toxicity Reduction Goals and Objectives**

The goal of our toxicity reduction strategy is to reduce the environmental and public health impacts from exposure to hazardous products used by and generated as waste by households and small businesses. Specific objectives include:

- Through EOE's Product Stewardship Initiative, reduce toxics in products and ensure proper post-consumer collection and recycling / reuse.
- Expand access to *all* Massachusetts residents and VSQGs to convenient, comprehensive, cost-effective hazardous product collection programs by 2010.
- Establish sixteen permanent hazardous product collection centers, four in each of the four DEP regions, by the year 2005.
- Double the year 2000 participation rate in hazardous product programs by 2005.
- Implement the toxicity reduction elements of the Regional Mercury Action Plan (e.g., reducing mercury in hospitals, establishing mercury-bearing products collection, pursuing mercury labeling and take back legislation).
- Increase participation in mercury waste collection programs to 50% of all municipalities by the end of 2003.
- Reduce mercury received at combustion facilities through source separation efforts by 50% by the end of 2003 over baseline inlet tests conducted in 1999.



- Reduce the use of hazardous products through responsible purchasing and alternative practices and products.
- Raise awareness of the impacts of hazardous products on the environment and public health.
- Pursue key toxics reduction legislation (e.g., toxics in consumer products, mercury product stewardship, used oil recycling, Environmental Stewardship initiative).

## **Toxicity Reduction Programs**

Key programs in our toxicity reduction strategy include:

- Promote the use of environmentally preferable products (EPP) and encourage product stewardship by:
  - ❑ Implementing EOE's Product Stewardship Initiative for reducing the use of toxic materials in products and manufacturing.
  - ❑ Developing criteria and methodologies for evaluating environmental attributes of various consumer and commercial products, including cleaners.
  - ❑ Evaluating opportunities to develop partnerships with retailers and manufacturers of EPP alternatives to hazardous products.
  - ❑ Pursuing legislation that advances the use of EPPs (e.g., toxics in consumer products).
- Establish cost-effective regional programs that will provide for collection of hazardous products at least 3 times per year at no greater than 30 minute driving distances, through:
  - ❑ Stand-alone regional facilities.
  - ❑ Collection centers at waste water treatment plants.
  - ❑ State university consolidation centers.
  - ❑ Mobile collection units.
  - ❑ Reciprocal agreements among regional groups for participation in hazardous product events.
- Promote regional coordination, local capacity building, and technical assistance including:
  - ❑ Regional networks to assist municipalities with program development.
  - ❑ Public/private partnerships.
  - ❑ State contracts to assist with needed procurement of goods (e.g., recycled paint for municipal or state use) and services (e.g., collection for municipalities).
- Provide equipment grants and services by:
  - ❑ Continuing to offer collection equipment through the Recycling Grant Program for the establishment of permanent local collection centers.
  - ❑ Providing subsidies to offset costs for recycling or disposing of target materials, such as mercury bearing wastes.
- Develop and implement training programs on proper management of hazardous products, best management practices, and health and safety issues for:
  - ❑ Municipal officials (departments of public works and schools).
  - ❑ Hazardous products collection center managers.
  - ❑ Building maintenance personnel.
  - ❑ The medical industry.

- Implement education and outreach programs by:
  - Promoting participation among residents, municipal and state agencies and small business groups in collection programs.
  - Developing outreach materials on best management practices for targeted generator groups, such as the health care industry.
  - Creating outreach and communication strategies to encourage individual consumers and small business purchasers to procure environmentally preferable alternative products.

## Recycling Strategy

Since 1990, Massachusetts has promoted a myriad of recycling and composting initiatives. Recycling and composting play an important role in managing the trash generated in homes and businesses by reducing the need for additional disposal capacity at landfills and waste combustors. Far more than a local waste management strategy, recycling is an important way of reducing environmental impacts. Recycling of materials reduces the need for virgin resources extracted from forests and mines. Recycling also saves energy, reduces emissions of greenhouse gases, and other dangerous air and water pollutants.

During the past ten years, recycling and composting programs operating throughout the state have resulted in a substantial amount of waste diversion. The recycling and composting rate in 1998 was 36%<sup>4</sup>, up from 10% in 1990. Today, 85% of Massachusetts residents have access to recycling programs - up from 10% of the population in 1990 - and 78% have access to curbside collection of recyclables. Over 150 new curbside recycling programs have been established in Massachusetts since 1990, serving 4.7 million residents.

A recent study initiated by EOEa of the cost-effectiveness of Massachusetts recycling and composting programs shows that 70% of municipalities have cost-effective recycling programs serving 70% of the state's 6 million residents. It also shows that 93% of communities have cost-effective composting programs. These results confirm that for most Massachusetts municipalities recycling saves money.

The rate of recycling progress can be seen in Table 2-2 by the number of Massachusetts municipalities (out of a total of 351) which have increased recycling rates over time.

**Table 2-2: Municipal Recycling Rates**

| <b>Municipalities<br/>Achieving...</b>         | <b>FY95</b> | <b>FY96</b> | <b>FY97</b> | <b>FY98</b> | <b>FY99</b> |
|------------------------------------------------|-------------|-------------|-------------|-------------|-------------|
| <b>&gt; 30%</b>                                | 61          | 124         | 150         | 181         | 181         |
| <b>20-29%</b>                                  | 76          | 106         | 114         | 86          | 90          |
| <b>10-19%</b>                                  | 122         | 79          | 60          | 53          | 46          |
| <b>5-9%</b>                                    | 22          | 19          | 15          | 12          | 11          |
| <b>&lt; 5%</b>                                 | 7           |             |             |             |             |
| <b>Not included due to<br/>incomplete data</b> |             | 23          | 12          | 19          | 23          |

<sup>4</sup> Includes estimates of backyard composting; without backyard composting the rate was 31%.



These increases reflect the following recycling program successes:

- 277 municipalities have obtained Department Approved Recycling Program (DARP) status, which means that they have met minimum criteria demonstrating their commitment to recycling and composting.
- 225 municipalities have started home composting bin distribution programs, and 186 municipalities operate centralized leaf and yard waste composting sites (this has resulted in the achievement of a 95% composting rate in the residential sector).
- 247 municipalities have participated in the Municipal Recycling Incentive Program (MRIP), which provides performance-based grants to municipalities who demonstrate an increasing commitment to recycling over time. These municipalities received \$4.5 million in direct payments for tons recycled. As a result of MRIP criteria, over 100,000 additional households (primarily multi-family dwellings) will receive recycling services in 2000.
- 93 municipalities have adopted Pay-As-You-Throw (PAYT) programs in which residents pay more to dispose more, providing an economic incentive to greater recycling and source reduction.
- DEP has awarded \$17.5 million in recycling grants to a total of 331 municipalities. These grants helped establish PAYT programs, 158 curbside recycling collection programs, 49 of the now-existing 195 waste oil collection programs (serving 70% of the state population), 84 paint collection programs (serving 39% of the population), and 67 mercury-bearing products collection programs. Grants also helped to distribute 69,000 backyard compost bins.
- Through regulation DEP has banned the disposal of a number of recyclable materials, including leaves and yard waste; lead-acid batteries; whole tires at landfills; white goods (e.g., large appliances); paper and cardboard; metal, glass, and plastic containers; and cathode-ray tubes (e.g., from televisions and computer screens).
- 295 municipalities have adopted buy recycled policies, largely as a result of grant and MRIP criteria.
- Since 1996, the Recycling Loan Fund has provided 16 loans totaling \$2.5 million, leveraging approximately \$8.7 million in private and public investments. This includes investments in recycling processors and manufacturers which use the following recyclable materials: clothing, construction and demolition debris, paper, scrap metal, tires, and wood. Loan funds have been used for the purchase of equipment and real estate and for working capital.
- In its first year, the Recycling Industries Reimbursement Credit (RIRC) grant program provided eight recycling processing and manufacturing companies with \$330,000 in grants, leveraging over \$750,000 in private investments and resulting in the processing of 70,000 tons of recyclable materials.

- The state spent \$42 million in 1999 on recycled products, up from \$2.8 million in 1992, and has made available or required in state contracts hundreds of recycled products, ranging from paper to motor oil, carpeting, and plastic park benches.
- MassHighway, in coordination with DEP, recycled 490,000 tons of waste in 1997 and 1998, reaching recycling rates of 96% and 94%, respectively.
- The state Operational Services Division's (OSD) environmental procurement program currently has two dedicated staff who help integrate environmental issues into a wide variety of state contracts, including environmentally preferable products and services. OSD prefers vendors who offer the use of environmentally-friendly pest management services, hazardous material collection, energy efficient office equipment, and product take-back services. These staff also conduct education and outreach efforts to purchasers at state agencies and municipalities, schools and other public entities, and hold an annual buy recycled vendor fair which attracts over 500 purchasing agents and 100 vendors every year.

### **Massachusetts Recycle 2000 Task Force Recommendations**

EOEA assembled a Task Force to study the state of recycling in Massachusetts and to recommend strategies to reinvigorate recycling to meet the *1990 Master Plan* goals. The Task Force issued its final report in February 1999, which included the following core recommendations:

- better enforce existing waste disposal bans,
- expand recycling processing capacity,
- require recycling plans for commercial and multi-family buildings,
- provide stronger incentives (and requirements) for variable rate (or PAYT) programs,
- develop a strong statewide uniform education message and outreach assistance.

DEP has already begun to act on some of these recommendations and has incorporated others into this *Plan* (for example, adding transfer stations to facilities subject to the waste bans and increasing waste ban enforcement, planning a statewide recycling education campaign, and pursuing multi-family recycling access legislation).

### **Recycling Goals and Objectives**

During the past ten years recycling has greatly reduced the need for disposal capacity and allowed the state to further its goal of closing unlined landfills. While significant recycling progress has been made and the citizens of the Commonwealth have embraced recycling as a way to protect the environment, increasing our recycling rate further will require a concerted effort by government, citizens, municipalities, businesses, and the waste industry.

In keeping with our commitment to reduce our reliance on disposal of waste in landfills and combustors, recycling must be improved and expanded. This means building on our existing programs and implementing new initiatives that will augment recycling rates throughout the state.



Specific objectives of the recycling strategy are:

- Encourage increased design for recycling through EOE's Product Stewardship Initiative.
- Increase recycling to support our 60% MSW waste reduction milestone.
- Increase C&D recycling to support our 88% C&D waste reduction milestone.
- Increase recycling access to residents currently being served by private haulers (apartments, condominiums, single family residences, etc.) or those in municipalities without comprehensive recycling service.
- Increase participation in recycling by businesses.
- Promote greater participation in recycling programs through education, establishment of PAYT programs, etc.
- Expand markets for materials collected and the products manufactured from recycled materials.

## Recycling Programs

Our recycling strategy for the next ten years will continue to focus on increasing access and participation in recycling programs and expanding recycling markets.

### Increasing Access and Participation

Our recycling efforts will focus on increasing access to recycling services for those currently not served (e.g., commercial businesses, multi-family residences, and single-family residences served by private/subscription haulers) and on increasing participation in existing and new programs. Over one million residents in the state currently do not have access to recycling. A number of the largest cities in Massachusetts do not offer full recycling services. Surveys have shown that the average participation rate for residents in recycling programs is 45% and is lowest in urban areas and larger cities. The average recycling rate in the 50 largest Massachusetts municipalities is 23%, compared to a 29% rate in the smaller cities of the Commonwealth. Increasing participation in existing programs can have a dramatic effect on the state's recycling rate.

Key programs in our recycling strategy include:

- Continue to enhance enforcement of recycling regulations and pursue recycling legislation.
  - Pursue legislation requiring that residents in multi-family units be provided with access to recycling.
  - Enhance enforcement of the waste bans.
  - Ban the disposal of unprocessed C&D material in 2003.
  - Explore raising the eligibility criteria for Department Approved Recycling Program status.
  - Ensure effective administration of the Bottle Bill.
- Promote the establishment of PAYT programs in municipalities.
  - Provide grants to assist in the development of PAYT programs.
  - Provide technical assistance to municipalities on implementing PAYT programs.

- Increase commercial recycling efforts throughout the Commonwealth.
  - Establish main street business recycling/composting cooperatives.
  - Explore regulation revisions that would remove barriers to recycling/composting.
  - Foster the development of a commercial organics collection infrastructure.
- Continue to provide grants for the development of municipal recycling infrastructures.
  - Provide recycling collection trucks for new and expanding programs.
  - Provide setout containers and totes to sustain and expand programs.
  - Examine other equipment needs to assist in creating and expanding materials collected.
  - Assist municipalities in developing a cathode-ray tube (CRT) collection infrastructure.
- Increase the program eligibility and awards provided through the Municipal Recycling Incentive Program.
  - Increase payments for tons recycled by municipalities.
  - Promote the enhancement of increased collection opportunities.
  - Encourage the development of promotions and programs to increase participation.
  - Improve and expand efforts to increase the purchasing of recycled products and environmentally preferable products.
- Enhance efforts to raise awareness and promote participation in recycling programs.
  - Create a statewide recycling participation campaign.
  - Publish municipal recycling rates annually to raise awareness of municipal recycling performance.
  - Distribute recycling information mailings to residents.
  - Actively educate and promote recycling to businesses.
  - Create informational tools to help better educate business and residents on the benefits of recycling to the Massachusetts environment and economy.
  - Continue to provide educational assistance on recycling to children through public schools and other forums.
- Offer grants to municipalities and regional groups to establish regional transfer stations.
  - Promote regional cooperation in the transport of recyclables and composting.
  - Provide transfer trailers to reduce the cost of transporting recyclables.
- Increase technical assistance to businesses, municipalities and consumers on recycling and composting.
  - Provide regional recycling coordinators to build capacity of municipal programs.
  - Enhance recycling/composting programs within state and municipal governments.
  - Research and test innovative recycling/composting collection technologies.
  - Provide information on the collection and processing of recyclables/compostables.
  - Use state contracts to provide cost-effective recycling/composting services.

### **Recycling Market Development Plan**

Developing and improving markets for recyclables will improve recycling rates and allow us to reap the benefits of recycling. Expanding the recycling base through market development can maximize the amount of recyclable materials that move through markets. Economically viable



and stable programs can support the development of processing capacity for recyclable materials, particularly those that consume secondary materials generated in-state. Recycling market development will also increase the competitiveness of the state's industries, reduce unemployment, and create improved job opportunities for Massachusetts workers. Today, companies in the state that use recycled materials employ 12,000 people and these jobs are linked to an additional 50,000 jobs in industries that support recycling.

Key programs in our market development plan include:

- Use EOEA's Product Stewardship Initiative to encourage manufacturers to design for recycling and to use recyclables in the manufacture of products.
- Increase grants and financial assistance to support recycling related businesses and industry.
  - Continue the Recycling Loan Fund.
  - Continue the Recycling Industry Reimbursement Credit Program.
  - Continue to fund and support the Chelsea Center for Recycling and Economic Development (Chelsea Center).<sup>5</sup>
- Expand the use of recycled and environmentally preferable products (EPP).
  - Continue to promote the Buy Recycled Business Alliance.
  - Continue to promote buy-recycled programs for municipalities and state agencies.
  - Continue to provide recycled product grants.
  - Continue to support the Mass. Newspaper Publishers Association use of recycled paper.
  - Reform the beneficial use determination (BUD) process to promote further reuse of materials.
  - Conduct a Buy Recycled Consumer Education Campaign.
  - Support environmentally preferable product (EPP) testing.
  - Promote Buy Recycled Cooperatives for businesses.
  - Promote markets for C&D recyclables.
  - Promote markets for food waste compost.
  - Continue research on recyclables markets and products through the Chelsea Center.
  - Pursue legislation aimed at increasing markets for recycled materials (e.g., used oil take back).

## Food Waste Recycling Initiative

DEP has started a new initiative to increase the diversion of food waste through composting and other means such as food banks, direct animal feed, processed animal feed, and land application. The key barrier to increased composting is the lack of processing capacity, which is compounded by increasing difficulty in siting such facilities.

To increase food waste composting, processing capacity must be increased. Due to the high volume of material, efforts to site processing facilities should focus first on developing new processing facilities to handle produce and other pre-consumer food generated by the

<sup>5</sup> The Chelsea Center for Recycling and Economic Development affiliated with the University of Massachusetts at Lowell provides technical assistance to Massachusetts businesses to increase their use of secondary materials.

industrial/commercial/institutional (ICI) sector. Currently, diversion in this sector is roughly 5-10% of materials generated. Through increased composting, DEP hopes to see the rate increase to 60% by 2010. Increased residential organics diversion could be phased in as additional processing capacity is developed.

Once the needed processing capacity is developed, DEP will consider adding food waste to the list of materials banned from disposal starting with ICI organics and expanding the ban eventually to organics generated in the residential sector.

Key activities in our food waste reduction strategy include:

- Evaluate barriers to composting and, where necessary, make changes aimed at fostering a positive climate for composting operations.
  - Promulgate the existing draft compost facility regulations and standards for compost product quality in order to provide clear standards for facility development.
  - Seek ways to facilitate small scale research and development projects, possibly through regulatory enhancements.
  - Modify existing approval processes to consider the size and technology of proposed composting operations (e.g., small, windrow-based composting operations vs. large, in-vessel enclosed systems).
- Explore expanding the state's role in siting new composting operations.
  - Expedite the permitting process for new capacity.
  - Maintain a comprehensive inventory of organics generation by type, quantity, and concentration by geographic area (i.e., density mapping to be used to facilitate the development of local organics collection infrastructures).
  - Assist compost facility proponents in identifying appropriate sites within designated areas.
  - Support or facilitate the use of brownfields as potential compost operation sites.
  - Insure adequate Massachusetts disposal capacity for residuals generated in the composting process.
  - Establish comprehensive organics recycling at all state correctional facilities, hospitals, and other state institutions where organics are generated in significant volume, to allow effective demonstration of organics recycling programs.
  - Work with the Department of Food and Agriculture to expand farm composting.
- Implement a Composting Education Campaign.
  - Conduct outreach to local permitting officials to foster better understanding of the composting process, the environmental and economic benefits, options for managing organic wastes, and the need for increased processing capacity.
  - Undertake efforts to raise awareness among the general public, citizens groups, Chambers of Commerce, state legislators, and other stakeholders about the need for, and benefits of, composting and recycling.



- Provide Grants and Technical Assistance.
  - Provide grants to the public and private sectors for research and development, product quality testing, compost operator training, capital equipment, assistance in developing in-house training materials for generators, and marketing of end-products.
  - Establish a composting operators training and certification course to promote well-run facilities.
  - Create an organics home page on DEP's web site to facilitate the exchange of information among various organics industry sectors.
  - Establish an internet forum for technical composting issues and make information available on the home page.
  - Maintain a directory of financial assistance, business, economic development organizations, and community development corporations to assist facility developers in accessing financing and business resources.

## Promoting Innovative Technologies

DEP recognizes that new and innovative technologies are critical to supporting our source reduction, toxicity reduction, and recycling strategies. Innovative technologies can provide opportunities to increase the reuse and recycling of waste materials, reducing the need for disposal capacity.

DEP supports innovative technologies through regulatory assistance, pilot projects, and cooperation and information sharing with other states and national organizations. The Strategic Envirotechnology Partnership (STEP) program, administered by EOEA, the Department of Economic Development, and the University of Massachusetts, also provides assistance to companies developing and implementing innovative technologies.

Examples of waste management innovative technologies include co-composting projects in the towns of Marlborough and Nantucket which use a containerized, or in-vessel, process to compost the organic portion of their municipal solid waste and wastewater treatment sludge. Using this process diversion rates of up to 90% can be achieved.

Another example of processing organic waste is thermophilic digestion, which applies high temperatures to a feedstock of wood, vegetative, and other organic portions of the waste stream. In one project, researchers at two U.S. laboratories have taken biomass materials, such as pulp and paper mill wastes, and created a biodegradable herbicide. The pulp and paper waste is converted into levulinic acid, a chemical "building block" that is normally produced from refined petroleum. It can now be produced from biomass at an estimated one-tenth the cost of using petroleum.

Specific ways in which DEP will continue to support innovative technologies that support waste reduction include:

- Researching innovative technology projects focusing on creating new processing techniques for recycling a greater range of materials, developing new uses for recyclables, and initiating pilot projects to evaluate and test new technologies and products.

- Seeking technologies with the potential to increase the reuse of wastes and materials that are of key concern in Massachusetts (e.g., organics, C&D debris, contaminated soils, paper sludge).
- Ensuring that regulatory requirements for the permitting of innovative technologies do not create inappropriate barriers to their use.
- Disseminating information about new technologies to DEP staff and potential users through the Innovative Technologies Clearinghouse, technical briefings, and technical reports.
- Providing appropriate regulatory assistance and referrals to other programs such as STEP for promising technologies identified through the Recycling Industries Reimbursement Credit program and the Chelsea Center.





## Chapter Three: Generation and Management of Solid Waste

This Chapter presents updated statewide solid waste generation and management information and describes significant trends in the waste management system. This Chapter also explains waste reduction – a new way to measure statewide milestones that includes both source reduction and recycling. A description of how DEP collects and analyzes solid waste data can be found in Appendix A: Data Methodologies.

### Solid Waste Generation and Management, 1994 - 1998

Table 3-1 presents a comprehensive picture of the generation and management of solid waste in Massachusetts for calendar years 1994-1998.

**Table 3-1: Solid Waste Generation and Management 1994 – 1998 (in tons per year)**

|                                | 1994       | 1995       | 1996       | 1997       | 1998       |
|--------------------------------|------------|------------|------------|------------|------------|
| Total Generation               | 9,710,000  | 10,780,000 | 11,600,000 | 11,870,000 | 12,390,000 |
| Exports                        | 430,000    | 470,000    | 820,000    | 860,000    | 1,210,000  |
| MSW                            | 7,050,000  | 6,760,000  | 7,330,000  | 7,680,000  | 7,930,000  |
| Residential                    | 2,870,000  | 3,130,000  | 3,280,000  | 3,670,000  | 3,660,000  |
| Commercial                     | 4,180,000  | 3,630,000  | 4,050,000  | 4,010,000  | 4,270,000  |
| Non-MSW                        | 2,660,000  | 4,020,000  | 4,270,000  | 4,190,000  | 4,460,000  |
| C&D                            | 2,420,000  | 3,760,000  | 4,010,000  | 3,840,000  | 4,270,000  |
| Other                          | 240,000    | 260,000    | 260,000    | 350,000    | 190,000    |
| Total Management               | 10,080,000 | 10,760,000 | 11,430,000 | 11,350,000 | 11,360,000 |
| Imports                        | 800,000    | 450,000    | 650,000    | 340,000    | 180,000    |
| Diversion                      | 4,060,000  | 5,040,000  | 5,310,000  | 5,490,000  | 5,960,000  |
| MSW                            | 2,160,000  | 2,140,000  | 2,410,000  | 2,590,000  | 2,840,000  |
| Residential Recycling          | 420,000    | 460,000    | 470,000    | 490,000    | 500,000    |
| Commercial Recycling           | 1,070,000  | 1,010,000  | 1,270,000  | 1,020,000  | 1,220,000  |
| Residential Composting         | 440,000    | 440,000    | 440,000    | 360,000    | 350,000    |
| Residential On Site Composting | *          | *          | *          | 530,000    | 550,000    |
| Commercial Composting          | 230,000    | 230,000    | 230,000    | 190,000    | 220,000    |
| Non-MSW                        | 1,900,000  | 2,900,000  | 2,900,000  | 2,900,000  | 3,120,000  |
| C&D                            | 1,900,000  | 2,900,000  | 2,900,000  | 2,900,000  | 3,120,000  |
| Disposal                       | 6,020,000  | 5,720,000  | 6,120,000  | 5,860,000  | 5,400,000  |
| Landfill                       | 2,680,000  | 2,510,000  | 2,830,000  | 2,620,000  | 2,260,000  |
| MSW                            | 1,900,000  | 1,540,000  | 1,620,000  | 1,430,000  | 1,060,000  |
| C&D                            | 550,000    | 700,000    | 900,000    | 890,000    | 1,070,000  |
| Other                          | 230,000    | 270,000    | 300,000    | 300,000    | 140,000    |
| Combustion                     | 3,340,000  | 3,210,000  | 3,290,000  | 3,240,000  | 3,140,000  |
| MSW                            | 3,320,000  | 3,190,000  | 3,250,000  | 3,230,000  | 3,130,000  |
| Non-MSW                        | 20,000     | 20,000     | 40,000     | 10,000     | **0        |

\* Residential on-site composting is included in Residential and Commercial composting.

\*\*Non-MSW combustion was less than 5,000 tons

The data in Table 3-1 for the years 1994 – 1996 is unchanged from what was reported in the *1997 Solid Waste Master Plan Update*. For the years 1997 and 1998, DEP improved its methodology for collecting and analyzing solid waste data. Three key changes that were made are:



- In past years, 200,000 tons of MSW was added to reported import tonnage because it was assumed that imports from other states were underestimated. The 200,000 tons import assumption has been removed since DEP now receives better quality import and export data that DEP receives from solid waste facilities and other states agencies.
- Residential and commercial composting numbers have been updated to better account for non-reporting composting sites. Also, estimates of backyard composting are broken out to better distinguish source reduction versus recycling activities.
- In past years, 200,000 tons of reported MSW disposed at landfills was assumed to be C&D debris that was misclassified by landfill operators. Therefore, this tonnage was subtracted from the reported MSW total and added to the C&D total. DEP believes that this assumption is no longer needed due to better accounting by solid waste facilities.

Appendix A describes these and other changes in further detail.

## Total Waste Generation and Management

**Figure 3-1: Total Solid Waste Generation in 1998**



In 1998, 12.39 million tons of solid waste (MSW and non-MSW) were generated in Massachusetts (including estimates of backyard composting). Of this amount, 7.93 million tons was MSW (64%), and 4.46 million tons was non-MSW (36%). Of the 12.39 million total tons generated, 5.96 million tons was recycled (48%). Between 1997 and 1998, waste generation increased 4.4%, from 11.87 million tons to 12.39 million tons. This increase is likely due to growth in the economy, population increases, and better data reporting.

In 1998, 5.40 million tons (44%) of waste generated was disposed either by landfilling (18%) or by combustion (25%). The state exported 1.21 million tons and imported 0.18 million tons, and was thus a net exporter of 1.03 million tons (8%) of total waste generated.

In 1998 there were 59 landfills and 8 combustors operating in the state that received MSW and/or non-MSW.

## Municipal Solid Waste Generation and Management

In 1998, 7.93 million tons of MSW was generated in Massachusetts, or 7.07 pounds per person per day. Of this amount, 36% was recycled, including on-site and off-site composting. The per capita recycling rate was 2.53 pounds per person per day, and the per capita disposal rate was 4.54 pounds per person per day.

**Table 3-2: How MSW was Managed in 1997 and 1998**

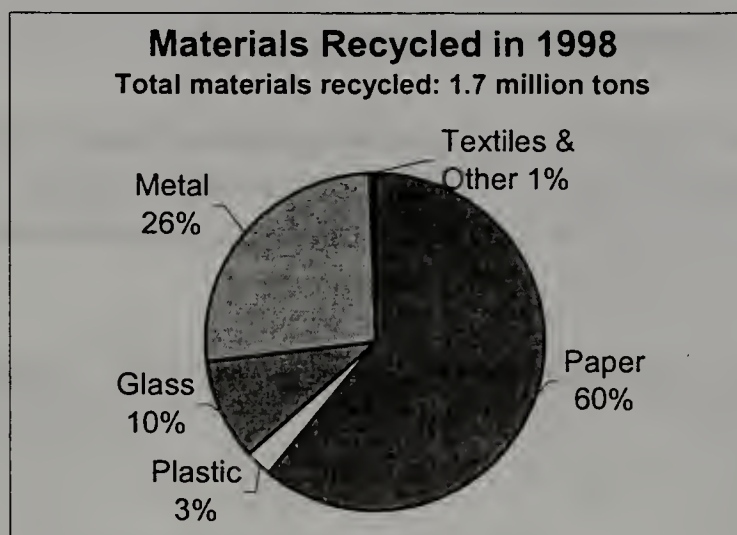
|                     | 1997 | 1998 |
|---------------------|------|------|
| <b>Recycled</b>     | 34%  | 36%  |
| <b>Combusted</b>    | 42%  | 40%  |
| <b>Landfilled</b>   | 19%  | 13%  |
| <b>Net Exported</b> | 5%   | 11%  |

Between 1997 and 1998:

- MSW generation increased 3%, from 7.68 million tons to 7.93 million tons. Per capita MSW generation rose from 6.42 pounds per person per day to 7.07 pounds per person per day.
- Residential generation decreased 0.3%, from 3.67 million tons to 3.66 million tons, while commercial MSW generation increased 6.5%, from 4.01 million tons to 4.27 million tons.
- MSW recycling increased from 2.59 million tons (34%) to 2.84 million tons (36%).
- MSW net exports increased by 107%, due to decreasing in-state disposal capacity and other factors such as business decisions on the part of the waste management industry.
- Total MSW disposed (disposed in state and exported out of state for disposal) decreased 3.8%, from 5.3 million tons to 5.1 million tons.



**Figure 3-2: Breakdown of MSW Materials Recycled  
(excluding composting)**



## Non-Municipal Solid Waste Generation and Management

In 1998, 4.5 million tons of non-MSW were generated in Massachusetts. Of this amount, 70% was recycled (all of which was C&D debris).

Between 1997 and 1998:

- Non-MSW generation increased 6.4%, from 4.19 million tons to 4.46 million tons.
- The amount of non-MSW processed increased 7.6%, from 2.90 million tons to 3.12 million tons, but the percent of materials recycled remained at 70% for both years.

In addition to non-MSW counted in Table 3-1 and in DEP's capacity estimates, there were additional materials generated and managed that have not historically been analyzed relative to disposal capacity. Please see Chapter Four for a more comprehensive discussion of the generation and management of non-MSW materials.

## Transition to Waste Reduction

To measure progress in achieving our vision of reducing waste generation and disposal to the maximum extent possible, we have set a total waste reduction milestone of 70% by 2010, including 60% MSW waste reduction and 88% non-MSW waste reduction. Within the 60% milestone, we expect to achieve 17 - 27% source reduction and 43% - 53% recycling<sup>1</sup>. Within the 88% non-MSW milestone, we expect to achieve 14 - 24% source reduction and 80 - 90% recycling. In the past, source reduction and recycling were considered separately (e.g., the *1990 Master Plan* set two separate goals for each of these waste reduction

<sup>1</sup> Please note that source reduction and recycling percentages are not additive, since they are calculated as a percentage of *potential* generation and *actual* generation, respectively.

strategies). We are now considering them as two components of an overall strategy to reduce disposal that affect each other.

In 1990, DEP set both source reduction and recycling goals, but at that time did not fully understand the relationship between the two activities. In fact, source reduction has lowered the overall tonnage of leaf and yard waste, glass containers, and other materials being recycled. Yet from an overall waste reduction viewpoint, this is good news, since fewer tons of waste are being produced in the first place, resulting in fewer tons of waste that must be managed.

For example, when DEP set its 46% recycling goal in 1990, the agency estimated that over 1 million tons (or 15% of the goal) would be achieved through the diversion of leaf and yard waste. Over the past decade, the majority of leaf and yard waste has in fact been diverted from disposal. However, the method for doing so has increasingly been backyard composting (which is considered a source reduction activity) rather than off-site composting (which is considered recycling). If the amount of backyard composting had not counted as recycled tonnage, our recycling rate would have been lower. To track progress in meeting the 46% recycling goal, DEP has included backyard composting in the recycling/diversion rate, since the tonnage being composted in backyards is part of the tonnage originally targeted for diversion.

Including backyard composting in the recycling rate has led to some confusion and also difficulties in comparing Massachusetts recycling rates to other states which follow EPA's guidance for calculating MSW recycling rates. EPA's guidance focuses strictly on recycling, and therefore excludes backyard composting. A clearer distinction between recycling and source reduction will make future comparisons easier.

Measuring waste reduction will allow us to capture the effects of both source reduction and recycling since they are inter-related waste management strategies. Using another example, in 1990, DEP estimated that 311,000 tons of glass containers would be recycled by 2000, contributing 5% to the overall 46% goal. However, according to industry data, glass containers have become lighter over time (a form of source reduction) and have increasingly been replaced by lighter plastic containers, reducing the tonnage of glass containers generated. Other products that have been lightweighted include aluminum cans and corrugated cardboard containers.

Over the coming decade, DEP plans to focus more attention on source reduction, and believes adopting a waste reduction milestone is the best way to measure the true impact of our efforts. There are difficulties in doing this however. Removing backyard composting from our recycling rate could give the mistaken impression that we have lost ground in our overall diversion efforts. In addition, there is not yet a precise way to measure source reduction. Until we have more experience in measuring source reduction, we will continue to include backyard composting in our recycling rate but will distinguish it from other recycling activities in order to begin transitioning to a system that better measures total waste reduction.



## Measuring Waste Reduction

Waste reduction is the combined effect of source reduction and recycling as a percentage of *potential* waste generation. Table 3-3 summarizes waste reduction in 1997. Source reduction was calculated using a methodology developed by Tellus Institute (described in the next section below).

**Table 3-3: MSW Waste Reduction in Massachusetts in 1997**  
(in tons)

|                                               |           |
|-----------------------------------------------|-----------|
| Projected generation without source reduction | 7,859,061 |
| Source reduction                              | 699,061   |
| <i>% of projected generation</i>              | 9%        |
| Recycling*                                    | 2,058,351 |
| <i>% of projected generation</i>              | 26%       |
| Total Waste Reduction                         | 2,757,412 |
| <i>% of projected generation</i>              | 35%       |

\* The recycling rate is 31% when based on actual MSW generation (excluding backyard composting).

Table 3-4 shows MSW waste reduction over time broken out for the residential and commercial sectors. Total waste reduction was 35% in 1997, the most recent year for which a gross state product (GSP) has been published (the GSP used for 1998 is a projection).

**Table 3-4: Total MSW Waste Reduction 1994-1998 (in tons)**

|                                 | 1994             | 1995             | 1996             | 1997             | 1998*            |
|---------------------------------|------------------|------------------|------------------|------------------|------------------|
| <b>Residential Diversion</b>    |                  |                  |                  |                  |                  |
| Source Reduction                | 715,480          | 505,934          | 453,323          | 632,349          | 558,084          |
| Recycling                       | 420,000          | 460,000          | 470,000          | 490,000          | 500,000          |
| Composting (off-site)           | 239,026          | 278,801          | 318,576          | 358,351          | 354,863          |
| <b>Subtotal</b>                 | <b>1,374,506</b> | <b>1,244,735</b> | <b>1,241,899</b> | <b>1,480,700</b> | <b>1,412,947</b> |
| <b>Commercial Diversion</b>     |                  |                  |                  |                  |                  |
| Source Reduction                | (513,451)        | 134,296          | (137,110)        | 76,711           | (296,242)        |
| Recycling                       | 1,070,000        | 1,010,000        | 1,270,000        | 1,020,000        | 1,220,000        |
| Composting                      | 230,000          | 230,000          | 230,000          | 190,000          | 220,000          |
| <b>Subtotal</b>                 | <b>786,549</b>   | <b>1,374,296</b> | <b>1,362,890</b> | <b>1,286,711</b> | <b>1,143,758</b> |
| <b>Total MSW Diversion</b>      | <b>2,161,055</b> | <b>2,619,031</b> | <b>2,604,789</b> | <b>2,767,412</b> | <b>2,556,705</b> |
| <b>Projected MSW Generation</b> | <b>7,051,055</b> | <b>7,239,031</b> | <b>7,524,789</b> | <b>7,859,061</b> | <b>7,641,842</b> |
| <b>Total MSW Diversion</b>      | <b>30.65%</b>    | <b>36.18%</b>    | <b>34.62%</b>    | <b>35.21%</b>    | <b>33.46%</b>    |

\* based on projected GSP for 1998.

Note: negative numbers (in parentheses) show source expansion.

## Measuring Source Reduction

In the past, DEP has not had a good way of measuring source reduction, which is essentially a measure of potential waste that is never generated. However, it is important to understand how source reduction contributes to waste reduction and how it affects the amount of

materials in the waste stream available for recycling. Source reduction can be measured on several different levels, including at the statewide aggregate level, at a specific site (e.g., a single facility), or from a specific program (e.g., backyard composting). To better understand source reduction efforts in Massachusetts, DEP contracted with Tellus Institute in March 1999 to study source reduction in Massachusetts.

Tellus has developed a methodology for measuring aggregate source reduction based on the premise (supported by historical trends) that waste generation is closely linked to the economy: as the economy expands, waste generation grows, and vice versa. Quantities of waste that would have been generated without source reduction can be estimated using a “driver” that reflects economic activity. Tellus recommended using gross state product as the driver for Massachusetts. The difference between the amount of waste expected based on economic activity (the driver) and actual amounts generated is a good estimate of source reduction.

Using the Tellus methodology, DEP estimated aggregate source reduction in 1997 to be about 699,061 tons relative to a base year of 1990. This is about 9% of the MSW that would have been generated without any source reduction. Source reduction occurred mainly in the residential sector for that year.

The equation used to make the estimate of source reduction for 1997 is:

$$\text{Source Reduction in 1997} = \text{Expected 1997 Waste Generation using 1990 Generation Rate} \text{ minus } \text{Actual 1997 Waste Generation}$$

Gross state product for 1997 multiplied by the 1990 generation rate provides the waste generation one would expect if the rate, or intensity, of waste generation in 1990 remained unchanged in 1997 (actual waste generated in 1990 divided by the driver for that year).

Some of the tonnage of MSW counted as source reduced by Tellus can be attributed to specific activities – many sponsored by DEP. Table 3-5 illustrates the source reduction amounts of a few specific efforts implemented in Massachusetts.

**Table 3-5: Impacts of Specific Source Reduction Efforts<sup>2</sup>**

| Effort                                          | Source Reduction (in tons) |
|-------------------------------------------------|----------------------------|
| Home Diversion of Organic Material <sup>3</sup> | 557,354                    |
| Pay as You Throw (PAYT)                         | 43,130                     |
| Newspaper Lightweighting                        | 55,920                     |
| Wooden Pallet Reuse                             | 71,000                     |

Tellus also developed estimates of additional MSW tonnage that could potentially be source reduced, totaling approximately 1.8 million tons.

<sup>2</sup> Tellus Institute, *Massachusetts Source Reduction Report*, December 6, 1999.

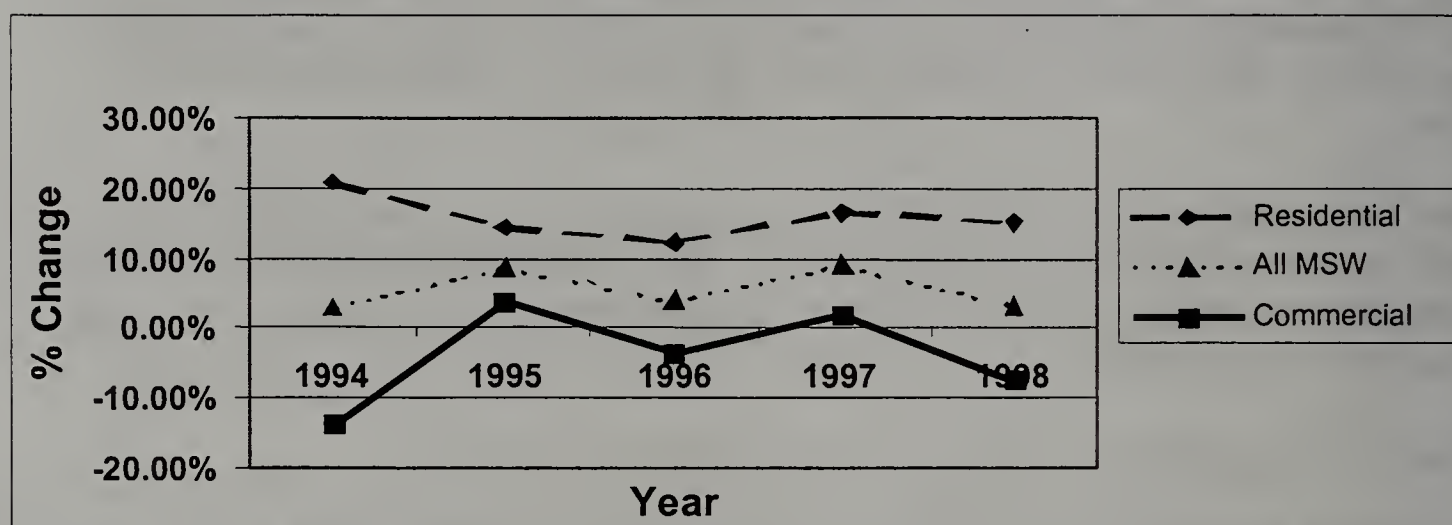
<sup>3</sup> Research International/Cambridge, *Residential Organic Waste Management Study*, October 1999.



Clearly, other source reduction efforts are taking place that have not been identified and/or measured. For businesses, these efforts are largely motivated by opportunities to increase efficiency and cut costs. For example, businesses are increasingly storing data electronically rather than on paper.

Figure 3-3 shows progress in source reduction estimated using the Tellus methodology for 1994-1998. The data shows significant fluctuations in source reduction estimates. This may partly be due to the varying quality of data DEP has for generation rates.

**Figure 3-3: Progress in Source Reduction**



Note: 1998 data is based on projected GSP for that year.

DEP will expand efforts to measure the impacts of specific source reduction programs in the coming decade, as well as to track aggregate source reduction results. Yet, it is important to note that the sum of specific programs that DEP measures will not always add up to the aggregate total; the programs are only a part of the total source reduction amounts.

## Chapter Four: Non-Municipal Solid Waste Streams

Historically, state and local waste planning efforts have focused primarily on municipal solid waste (MSW). However, there are a wide variety of non-municipal solid waste (non-MSW) streams that are managed within the Commonwealth which are interdependent with and affected by MSW management.

Non-MSW materials consist of all solid waste that is not classified as MSW as well as a variety of other waste-like materials. Included in non-MSW is C&D debris, industrial wastes and sludges, wastewater treatment facility sludges, and street sweepings. It also includes certain materials that are at times handled using solid waste management practices, such as contaminated media (i.e., dredge and soils).

Non-MSW waste streams pose significant management challenges. Many of these materials are not combustible and are not readily subject to volume reduction. If improperly managed, non-MSW materials can adversely impact human health and the environment when disposed, or if no disposal or management option is readily available, the material can continue to pose human health and/or environmental problems at the location of generation.

Attempts to increase the value-added quality of these materials and to implement better reuses have not yet met with success. For the most part, these waste streams remain dependent on a diminishing number of landfills for both reuse and disposal, and they compete with MSW for disposal capacity. The decreasing number of options for landfill reuse and disposal is also leading to an increase in the number of requests for reuse options for these materials at non-landfill locations, posing new environmental and regulatory challenges to DEP.

In keeping with our vision of increasing waste reduction and minimizing disposal, we will continue to seek ways to increase source reduction and recycling of these materials, relying on disposal in landfills only as a last resort. Specific actions we will take include:

- developing strategies to increase reuse and recycling of non-MSW materials;
- banning the disposal of unprocessed C&D beginning in 2003;
- revising the beneficial use determination (BUD) regulations to make improvements to facilitate the safe use of waste materials through a more streamlined and efficient permitting process;
- creating a multi-disciplinary team within DEP to begin the work of better accounting for these materials and establishing a planning process to ensure their responsible management.

### Summary of Management Options

The management of non-MSW material streams broadly falls into one of the following categories: disposal at landfills or dedicated monofills; beneficial use at landfills or monofills (either during their active stage or during closure activities); and other management means including beneficial use at non-landfill locations. Table 4-1 summarizes management of non-MSW materials in these categories. Nearly 7 million tons of non-MSW material, plus more than 1.4 million cubic yards<sup>1</sup> of non-MSW dredge, were generated in 1998. Of this total, C&D represents over 4.1 million tons, of which 73% was recycled or reused.

<sup>1</sup> Dredge materials have a high water content and therefore expressing amounts in tons would skew quantities reported.



**Table 4-1: 1998 Non-MSW Materials Management (in Tons)**

| Material                   | Approx. Generated <sup>1</sup> | Landfill Disposed | Beneficially Used at Active Landfills | Monofill Disposed | Beneficially Used at Monofills | Other Beneficially Used (Non Landfill) | Other Management Means  |
|----------------------------|--------------------------------|-------------------|---------------------------------------|-------------------|--------------------------------|----------------------------------------|-------------------------|
| MSW Combustion Ash         | 842,642                        |                   |                                       | 710,802           | 64,246 <sup>2</sup>            |                                        | 67,594 <sup>3</sup>     |
| Coal Ash                   | 509,017                        | 21,527            | 3,500                                 | 261,469           |                                | 216,614                                | 27,434 <sup>4</sup>     |
| 21E Contaminated Soils     | 357,360                        | 9,005             | 189,091                               |                   |                                | 115,146                                | 44,118 <sup>5</sup>     |
| Non 21E Contaminated Soils | 666,025                        | 96                | 587,575                               |                   |                                | 78,354                                 |                         |
| Marine Dredge              | 1,274,229 CY                   | 750 CY            | 14,620 CY                             |                   |                                | 728,609 CY                             | 530,250 CY <sup>6</sup> |
| Fresh Water Dredge         | 163,323 CY                     | 1,700 CY          | 16,625 CY                             |                   |                                | 144,998 CY                             |                         |
| C&D Waste                  | 4,283,910                      | 1,065,613         | 98,281 <sup>7</sup>                   |                   |                                |                                        | 3,120,016 <sup>8</sup>  |
| DPW Waste                  | * <sup>9</sup>                 | 30,142            | 22,829                                |                   |                                |                                        |                         |
| ASR Fines                  | *                              |                   | 188,028                               |                   |                                |                                        |                         |
| Paper Sludge (DT)          | 96,000                         | 65,600            | 30,399                                |                   |                                |                                        |                         |
| WWTP Sludge(DT)            | 172,000                        | 15,600            |                                       | 32,800            |                                | 26,700                                 | 96,700 <sup>10</sup>    |
| WTP (DT)                   | *                              | 1,432             |                                       |                   |                                |                                        |                         |
| Asbestos                   | *                              | 7,134             |                                       |                   |                                |                                        |                         |
| Other Daily Cover          |                                |                   |                                       |                   |                                |                                        |                         |
| Kiln Dust                  | *                              |                   | 1,236                                 |                   |                                |                                        |                         |
| Tire Chips                 | *                              |                   | 12,338                                |                   |                                |                                        |                         |
| Wood Chips                 | *                              |                   | 6,600                                 |                   |                                |                                        |                         |
| Wood Ash                   | *                              |                   | 2,204                                 |                   |                                |                                        |                         |
| Compost                    | *                              |                   | 985                                   |                   |                                |                                        |                         |
| Crushed Glass              | *                              |                   | 29                                    |                   |                                |                                        |                         |
| Industrial Waste           | *                              | 34,834            |                                       |                   |                                |                                        |                         |
| Other (Non-MSW)            | *                              | 15,244            |                                       |                   |                                |                                        |                         |
| SUP/ Special               | 3,902                          | 240               |                                       |                   |                                |                                        | 3,617                   |
| Wood Waste                 | *                              | 1,251             |                                       |                   |                                |                                        | 1,001                   |
| Natural Disaster Debris    |                                |                   |                                       |                   |                                |                                        |                         |
| <b>TOTAL (Tons)</b>        | <b>6,930,856</b>               | <b>1,267,718</b>  | <b>1,143,095</b>                      | <b>1,005,071</b>  | <b>64,246</b>                  | <b>436,814</b>                         | <b>3,360,480</b>        |
| <b>TOTAL (CY)</b>          | <b>1,437,552</b>               | <b>2,450</b>      | <b>31,245</b>                         |                   |                                | <b>873,607</b>                         | <b>530,250</b>          |

<sup>1</sup> Approximate because it does not account for imports and exports; also excludes C&D fines and non-21E soils used for landfill closures, and materials sent to certain monofills and other sites (e.g., Quarry Hills).

<sup>2</sup> Used as daily cover.

<sup>3</sup> Post-burn metals recovery.

<sup>4</sup> Reported as generated by one facility but without an indication of how it was managed.

<sup>5</sup> Incineration and thermal processing.

<sup>6</sup> 529,650 cubic yards was disposed at the Massachusetts Bay and Cape Cod Bay in-water disposal sites.

<sup>7</sup> C&D fines used as daily cover.

<sup>8</sup> Recycled.

<sup>9</sup> Generated quantities of these materials are unknown at present.

<sup>10</sup> 42,300 tons were exported, 53,800 tons were incinerated in state, and 600 tons were managed in state by other means.

It should be noted that a significant amount of material is not accounted for in Table 4-1, including C&D fines and non-21E contaminated soil being used to close unlined landfills that have ceased operations (and which do not submit annual reports to DEP) and Central Artery / Third Harbor Tunnel excavate disposed at other sites (e.g., Quarry Hills, Hallet Street Landfill, etc.).

## Dependence of Non-MSW Materials on Landfills

Excluding dredge material, approximately 35% of the estimated non-MSW tonnage is either disposed or beneficially used at active landfills. A significant amount of material is used as daily cover to control vectors, fires, and odors, and to minimize percolation of water into landfills. It is also used for grading and shaping and related engineering purposes. Table 4-2 shows that the quantities of contaminated soil and other non-MSW materials being substituted for clean soil/sand for use as daily cover and grading and shaping material are increasing as a percent of total quantities used. The use of clean soil/sand at landfills decreased from 44% to 28% between 1997 and 1998, while the use of contaminated soil and other non-MSW materials increased from 56% to 72% of the total used.

**Table 4-2: Reported Daily Cover Material at Active Landfills**

|                          | 1997 Tons | 1998 Tons |
|--------------------------|-----------|-----------|
| <b>Soil/Sand</b>         | 881,559   | 431,463   |
| <b>Contaminated Soil</b> | 686,121   | 549,171   |
| <b>Other Materials</b>   | 414,240   | 562,001   |
| <b>Total</b>             | 1,981,920 | 1,542,635 |

The overall decrease in the total amounts of daily cover between 1997 and 1998 reflects the decrease in the number of active landfills. With fewer landfills, decreasing amounts of non-MSW material can be beneficially used in this application and increasing amounts of non-MSW material will require other management approaches, which are currently limited.

An additional quantity of non-MSW (primarily contaminated soils and C&D fines) is being beneficially used in conjunction with the closure of active unlined landfills, but these amounts do not appear in Table 4-2. The last of the active unlined MSW landfills required to close (as required by Chapter 153 of the Acts of 1992) will complete their closures in 2000, resulting in the loss of even more outlets for the beneficial use of non-MSW materials and adding to the pressure at the remaining active landfills.

## Beneficial Use Determination Review

The majority of beneficial use determinations (BUDs) that DEP has issued have been for alternative daily cover or grading and shaping material at landfills. With decreasing landfill capacity, these materials will require alternative management options.

DEP has received some BUD proposals that involve non-landfill applications; however, these types of proposals trigger many complicated issues. When waste materials are placed in the general environment, the potential for exposure to people increases and issues of risk come into



play. These types of BUD decisions cannot be made quickly, since information must be collected and analyzed demonstrating that the reuse option will not present an unacceptable risk.

To facilitate the use of BUDs, DEP is currently reviewing the BUD process. The goal of this review is to identify improvements in the BUD program that will both facilitate the safe use of waste materials and will result in a more streamlined and efficient permitting process.

## Summary of Specific Non-MSW Materials

### Construction and Demolition Debris

In 1998, approximately 4.2 million tons of C&D was generated, which is the single largest category of non-MSW material. Approximately 73% was recycled or reused in some beneficial manner with the remainder being disposed almost exclusively in landfills. Due to its large volume and because a large portion of C&D can be recycled, C&D has been identified as a waste stream for which this *Plan* identifies specific actions to increase waste reduction.

Historically, C&D recycling has not received as much attention as MSW recycling in state planning efforts. C&D can be divided into three distinct types: road and bridge construction, building demolition, and new building construction. Due to available markets, there is already an infrastructure in place for recycling road and bridge material [i.e., asphalt, brick, and concrete (ABC), and metals], and these same materials are also routinely diverted from building demolition and construction waste. Table 4-3 shows the amounts of C&D generated, recycled, and disposed in Massachusetts in 1998.

**Table 4-3: C&D Management in 1998**

|                        | <b>Tons</b>      | <b>Percent</b> |
|------------------------|------------------|----------------|
| <b>Generated</b>       | <b>4,270,000</b> |                |
| • <b>Disposed</b>      | 1,070,000        | 25%            |
| • <b>Net Exported</b>  | 80,000           | 2%             |
| • <b>Recycled</b>      | 3,120,000        | 73%            |
| □ <b>ABC</b>           | 2,990,000        | 96%            |
| □ <b>Metal</b>         | 30,000           | 1%             |
| □ <b>Non-fuel Wood</b> | 45,000           | 1%             |
| □ <b>Other</b>         | 55,000           | 2%             |

With the current shortfall in overall disposal capacity in the state, C&D is competing with MSW for landfill space. Landfill operators prefer to take MSW over C&D, since MSW is denser and uses less space per ton than C&D. Transfer stations are also less willing to handle C&D because of its bulky characteristics and because of the lack of general disposal capacity. As a result increasing amounts of C&D are exported out of state.

Much of the raw C&D debris going directly into landfills contains significant amounts of materials that can be recycled, such as wood waste, roofing materials, and gypsum wallboard, but for which there are poor markets. Separation of C&D into usable (clean) and unusable components at the job site is the best way to recycle this waste stream. Where C&D is not source separated, the technology exists to process mixed C&D to recover recyclables. While a

number of new processors who take mixed C&D have started business in the last few years, additional processing capacity is needed in Massachusetts to further increase C&D recycling.

Key barriers to increased C&D waste reduction include:

- Insufficient C&D processing capacity and difficulty in siting new processing facilities.
- Diminishing disposal capacity for C&D residuals.
- Diminishing reuse capacity for C&D fines (as landfill alternative daily cover or grading and shaping material) due to the completion of most active unlined landfill closures.
- Lack of markets for wood waste and materials other than concrete, brick, asphalt, and metal.
- Lack of source separation of recyclable materials at construction sites due to space, cost, and logistical barriers.

While barriers exist, significant gains can be made in reducing and recycling C&D waste. DEP believes that banning the disposal of unprocessed C&D in 2003, in combination with other efforts, will help achieve these gains. Such a ban would preserve landfill capacity, provide a more reliable market for processing facilities (which would in turn increase the likelihood of additional processors being proposed and sited), and provide incentives for source reduction and source separation of C&D recyclables. In order to make a ban effective, there are a number of needed actions that DEP will promote:

- Continue to promote C&D source reduction (as described in the Source Reduction Strategy in Chapter 2);
- Continue to promote existing loan and grant programs (i.e., Recycling Loan Fund and Recycling Industry Reimbursement Credit) that can provide financial resources for the development of a C&D recycling infrastructure;
- Promote new end-use markets for processed C&D materials;
- Work with the design and construction industry to promote better design for recycling and source separation of recyclables through technical assistance and education;
- Implement pilots for job site separation of C&D for public projects and residential homebuilding;
- Explore changes to permitting requirements (at the state and local level) that would promote C&D recycling, including promoting C&D recycling in projects undergoing MEPA review and encouraging local building permits to provide incentives to contractors to recycle the materials they use;
- Work with state agencies to explore additional specifications for the reuse of salvaged material, use of materials with recycled content, and use of appropriate C&D recyclables on state projects;
- Assist the waste industry and municipalities who are seeking to expand or site new C&D processing facilities;
- Allow C&D residuals to be used to close inactive unlined landfills. DEP has issued guidelines for using C&D materials to achieve proper grades for closing inactive unlined landfills. This policy will provide an outlet for C&D residuals, mitigate the cost of assessing and closing unlined landfills, and eliminate or reduce threats from unlined landfills;
- Establish a preference for C&D and other residuals disposal facilities as a way to promote C&D processing (see Chapter Five).



## MSW Combustion Ash

There are currently 7 waste-to-energy combustors operating in Massachusetts. For the most recent year for which ash generation data is available (1998), there were 9 combustors operating (2 of these combustors – one in Fall River and one in Lawrence -- closed during 1998). In 1998, the 9 combustors generated 775,048 tons of combustion ash (excluding recovered post-burn metals). The majority of this ash was disposed in one of 6 MSW combustion ash monofills located in Massachusetts. A number of these monofills are nearing their capacity, and therefore efforts are underway by a number of combustors to locate additional capacity.

**Table 4-4: Active MSW Combustion Ash Landfills**

| <b>Municipality</b> | <b>Site Name</b>           | <b>Est. Year of Closure</b> |
|---------------------|----------------------------|-----------------------------|
| Agawam              | Bondis Island Ash Landfill | 2001                        |
| Peabody             | Peabody Ash Landfill       | 2006                        |
| Saugus              | RESCO Ash Landfill         | 2007                        |
| Shrewsbury          | Shrewsbury Ash Landfill    | 2008                        |
| Haverhill           | Ogden Martin Ash Landfill  | 2009                        |
| Carver              | CMW Ash Landfill           | 2016                        |

## Coal Ash

Approximately 500,000 tons of coal ash were generated in Massachusetts during 1998 by utilities and other large users. The majority (47%) was disposed at a single dedicated ash monofill which has sufficient capacity at its current acceptance rate through the year 2015. Forty-four percent was beneficially reused at non-landfill locations, principally in civil engineering applications, and 25,000 tons were managed at MSW landfills. Since the existing Rezendes ash monofill is expected to provide capacity for the next 15 years, this non-MSW waste is being handled adequately.

## Contaminated Soil

There are two broad categories of contaminated soils that can be handled through solid waste management practices: soils generated and managed pursuant to Chapter 21E and the Massachusetts Contingency Plan (MCP), and other non-21E contaminated soils. The majority of Chapter 21E soils are transported using the MCP's bill-of-lading process. Non-21E contaminated soils include those from in-state locations that do not trigger notification requirements under the MCP, such as soil contaminated with lead from lead-based paint (for example, residential lead soil) and contaminated urban excavate below the MCP's reportable concentrations, and contaminated soil from out-of-state.

In 1998, more than 1 million tons of contaminated soil were received at Massachusetts disposal facilities. Of this amount, 76% was reused at landfills (either sent directly, or processed beforehand), 1% was disposed at landfills, 19% was reused at locations other than landfills (principally in civil engineering applications), and 4% was managed in other ways, such as incineration and thermal treatment.

Contaminated soil is currently highly dependent on MSW landfills for its management, mainly for reuse as daily cover material. Available landfill capacity can thus significantly impact the management of contaminated soil. The loss of reuse options at landfills could be a disincentive for private parties to reduce risks through cleanups (including residential lead soils) and increase the cost of development projects in urban locations, including the rehabilitation of "brownfield" sites. Options to consider in addressing contaminated soils to facilitate cleanups and risk reduction in Massachusetts include: promoting remedial technologies that provide full destruction of contaminants; permitting of facilities other than landfills that can offer treatment of contaminated soils; and developing monofills dedicated to contaminated soils.

The volume of contaminated soil is expected to continue to be significant in the future. Based on planned development projects in Massachusetts, more than 4 million cubic yards of contaminated soil will be generated over the next few years. Therefore, available landfill capacity and alternative management options for contaminated soils will continue to require analysis and planning.

### **Dredge Materials**

Most of the marine dredge generated in Massachusetts is beneficially used in non-landfill applications (e.g., beach nourishment) or brought to in-water disposal areas. Therefore, in-state landfill capacity does not significantly affect these materials. Capacity may be needed, however, for dredge that is highly contaminated and not appropriate for in-water disposal. Based on proposed dredging projects, it is expected that between 2000 and 2006 more than 8 million cubic yards of marine dredge will be generated. The management of these materials warrants further analysis and planning.

The amount of fresh water dredge generated is much smaller than marine dredge but potentially more dependent on landfill capacity due to the lack of viable in-water disposal options. If this dredge is not contaminated (approximately 90% of 1998 generation estimates), it can be beneficially reused in an upland non-landfill application. However, if contaminated, it will likely require disposal and/or reuse at a landfill. DEP is aware of a number of fresh water dredge projects that are not going forward or are being scaled down from their original scope due to the difficulty in finding adequate disposal capacity (e.g., the Muddy River). The availability of reuse and disposal options for fresh water dredge warrants further analysis and planning, since these options will often determine the feasibility of proposed projects.

### **Automobile Shredder Residue (ASR)**

Automobile Shredder Residue (ASR) is generated by recycling companies that shred automobiles and white goods for metals recovery. ASR is primarily comprised of plastic, rubber, carpeting, fabric, and other non-metallic components and can potentially contain a number of hazardous constituents. In Massachusetts, metal recycling companies that generate ASR have a Conditional Declassification under the hazardous waste regulations and a Beneficial Use Determination that allows them to use ASR as alternative daily landfill cover provided they implement certain management practices to ensure that the ASR is not contaminated above threshold levels. A significant quantity of ASR is expected to be generated in the future and faces increasing competition from other materials for use as alternative daily cover.



## **Wastewater Treatment Plant Sludge**

The majority of wastewater treatment plant sludge is burned at sludge-only incinerators or beneficially used. Modest amounts of sludge will continue to be disposed at landfills.

## **Paper Sludge**

In 1997, 96,000 dry tons of paper sludge were generated. Of this amount, 68% was disposed at landfills and 32% was used as alternative daily landfill cover material. Paper sludge is highly dependent on landfills for its management and future volumes are expected to double in a short period of time. A proposed paper de-inking plant in Fitchburg will likely increase generation of paper sludge in 2000 to approximately 144,000 dry tons.

## **Disaster Debris**

The disposal problems created by a natural disaster are many for all concerned. In the case of a natural disaster, a significant amount of waste material is generated rapidly. This waste must be quickly cleaned up, transported, and processed or disposed. The resulting volumes depend on the type and the severity of the disaster. Potential quantities of material generated by a natural disaster have been estimated for three scenarios and reflect the amount that would require management:

1. Category 1 Hurricane: 50,000 cubic yards.
2. Category 3 Hurricane: 3,500,000 cubic yards.
3. Seismic Event, Boston, 6.0 on Richter Scale: 10,000,000 cubic yards.

The *Commonwealth of Massachusetts Disaster Debris Management Plan* (developed by the Massachusetts Emergency Management Agency) assumes a major disaster could overload the existing waste management capacity in Massachusetts. Managing the sheer volume of debris will require: separation of debris into various component parts; an array of management methods (recycling, burning, reuse, volume reduction, and landfilling); and the commitment of both public and private resources. Management of disaster debris warrants further analysis and planning.

## **Other Materials**

There are a number of additional materials listed in Table 4-1 which rely to some degree on landfills for disposal and/or reuse, including street sweepings, asbestos wastes, etc. The quantities of these materials dependent on landfills are generally not large, but will continue to depend on landfill capacity in the future.

## Chapter Five: Management Capacity Projections

Our waste management hierarchy places priority on source reduction and recycling as the most environmentally preferable ways to manage our waste. Proper disposal of waste in a way that ensures the protection of public health and the environment should only be relied on as a last resort to manage those materials that cannot be feasibly source reduced or recycled. In identifying and planning for our future waste management capacity needs, we will rigorously apply this hierarchy to ensure that we achieve our vision of maximum waste reduction and minimum waste disposal.

### No Net Import or Net Export Goal

Since 1988, Massachusetts has maintained a policy that limits waste disposal capacity to the amount generated within the state that is not recycled, so that on balance we should be neither a net importer nor a net exporter of trash. This Plan re-affirms this policy, recognizing that we should take responsibility for managing our own solid wastes.

Currently, our management system is out of balance and Massachusetts is a net exporter of trash. To meet our goal of no net import or export, we must increase our management capacity. This increase in capacity must be done in a way that supports our goal of maximum waste reduction.

Providing for our own waste management needs makes sense from both an environmental and economic perspective. Exporting waste does not avoid the potential adverse impacts of disposal, but only changes the location where these impacts occur and creates additional impacts from increased transportation. Exporting of wastes also means losses in revenues from recyclables recovery.

Another reason export is not a good long-term management strategy is that this approach limits the ability of Massachusetts to respond to changing political conditions. Other states have begun considering ways to limit trash imports. While states cannot restrict interstate waste transport, there may be ways they can limit disposal capacity to what they need for their own state, similar to what Massachusetts has done, and their recent actions indicate that they are moving in this direction.

Beyond what states may do individually, a number of bills have been filed in the U.S. Congress that would grant states the right to restrict waste imports. While the outcome of these proposals is uncertain, Massachusetts should have a waste management strategy that can respond adequately if new federal legislation is enacted granting states explicit authority to restrict waste imports. Providing for our own waste management needs is the best way to do this.

### Waste Management Capacity Projections

Figure 5-1 shows our projected waste management capacity need through 2010, using as a baseline our 1998 waste reduction rate and currently permitted disposal capacity. Figure 5-2



shows how we plan to address this capacity need through implementing this *Plan*. The data underlying Figures 5-1 and 5-2 are found in Table 5-2 at the end of this Chapter. Assumptions used for capacity projections also are found at the end of this Chapter.

It is important to note that, as with any forecast of the future, these projections are uncertain, but are necessary for describing and planning for our future. These projections will be revised and may change significantly from year to year depending on the actual performance of our waste management system. If waste reduction increases more than currently projected, we will need less disposal capacity than currently projected. Conversely, if waste reduction does not increase as expected, we will need to consider more disposal capacity than currently projected. We will monitor our progress annually and adjust our projections accordingly.

Chapters Two and Four describe our strategy for increasing waste reduction capacity for MSW and C&D. This Chapter describes additional disposal capacity needed, and identifies strategies to ensure that this capacity supports rather than undermines increased waste reduction.

**Figure 5-1: Baseline Waste Management Capacity Need**

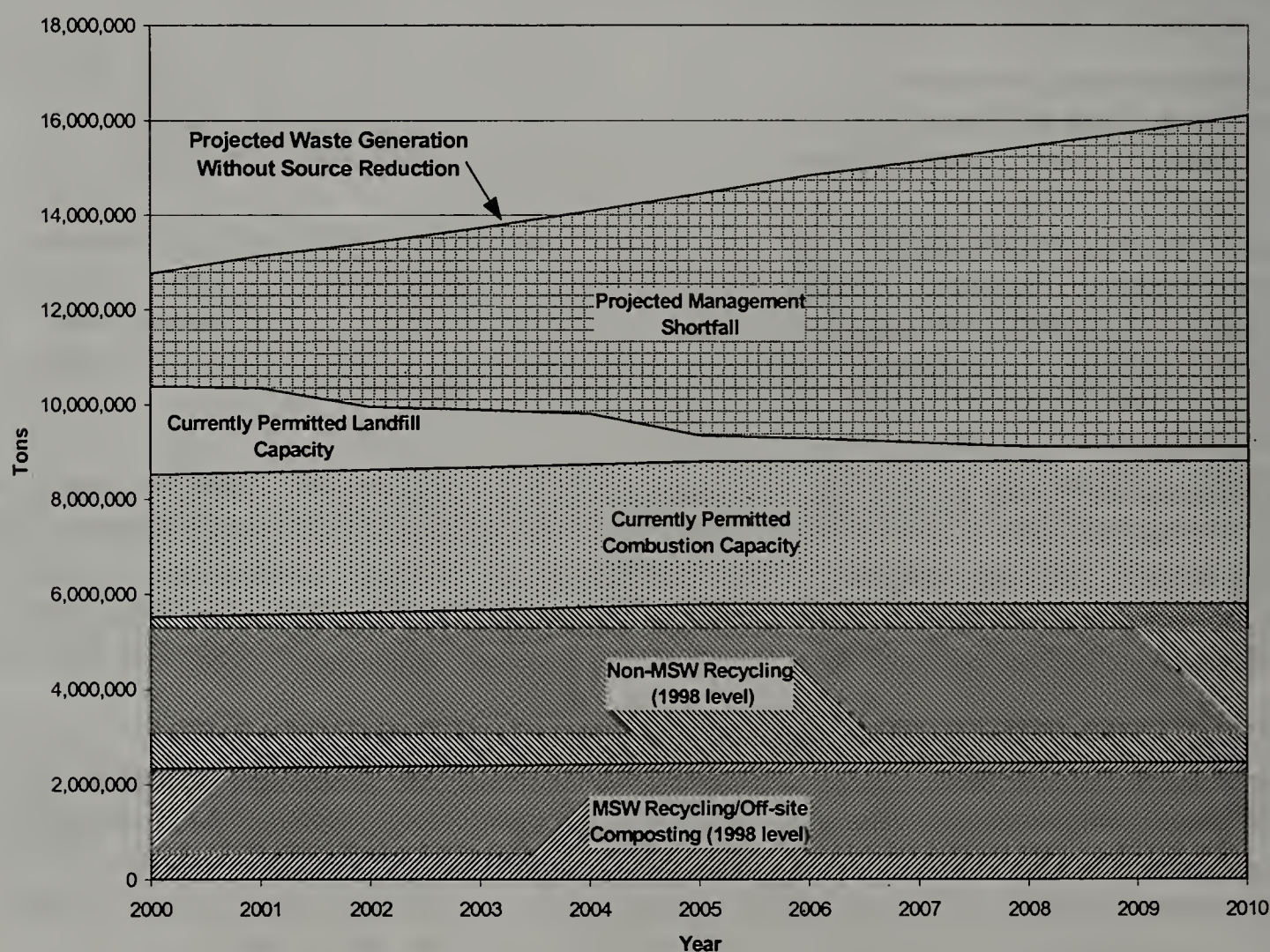
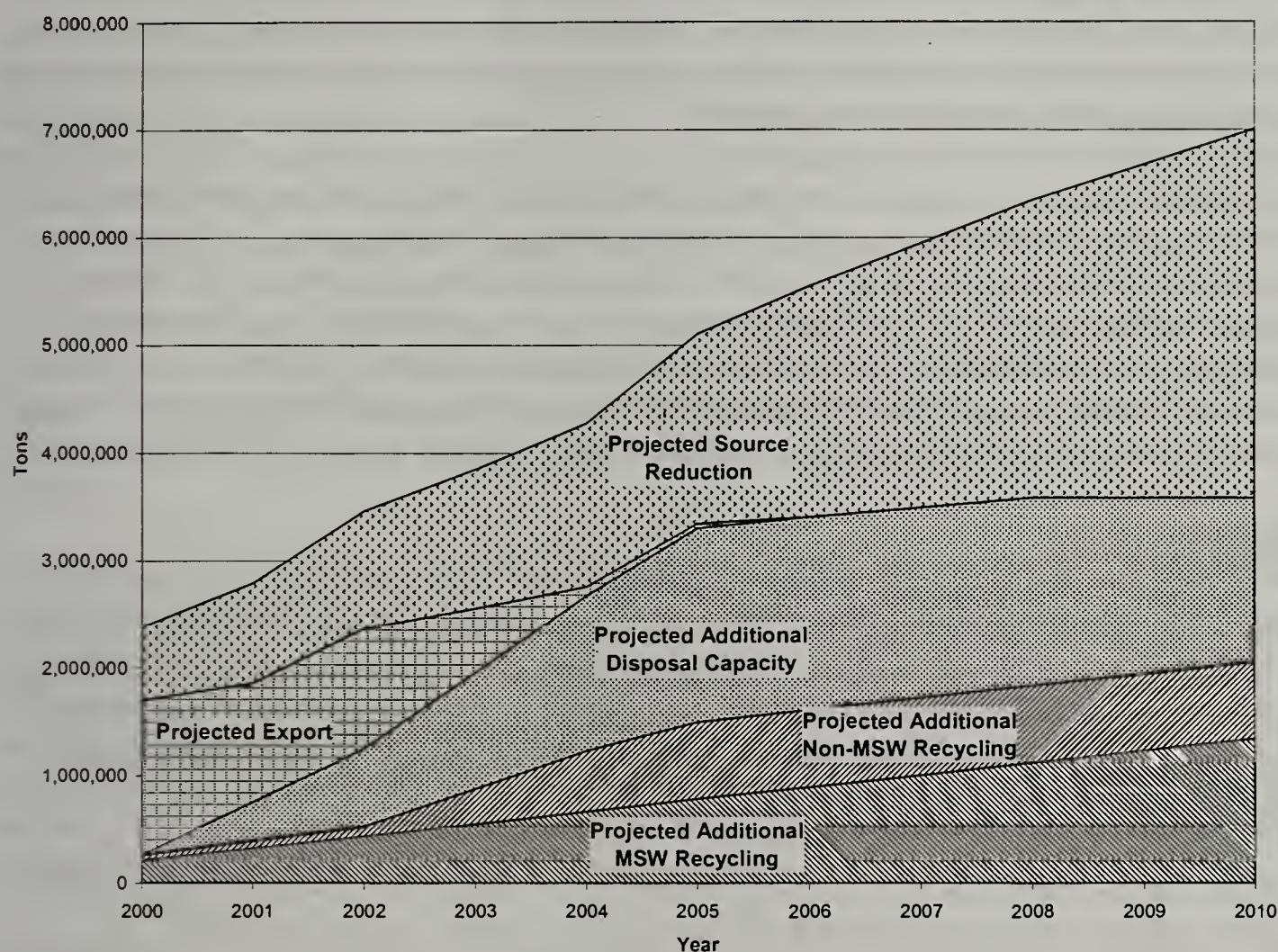




Figure 5-2: Waste Management Capacity Allocation



## Disposal Hierarchy

The 1990 *Solid Waste Master Plan* established a waste management hierarchy favoring source reduction, followed by recycling and then disposal, with a preference for waste-to-energy combustion over landfilling. The 1990 *Plan* set year 2000 goals for MSW of 46% recycling, 50% combustion with energy recovery, and 4% landfilling. In 1998, 7.89 million tons of MSW was managed by 36% recycling, 40% combustion (resulting in 711,000 tons of ash landfilled), 13% landfilling, and 11% net export.

Waste-to-energy combustion facilities were originally favored over landfills because combustion reduces the volume of waste, recovers energy, reduces pathogens, and offers considerable flexibility for adding new pollution control measures. The original preference was not based on a comparative risk analysis. However, the impacts of landfills were generally thought to be greater at that time, and there were clear cases where landfills had caused groundwater contamination problems.

Since 1990, landfill regulations and combustor air emission regulations have become more stringent. Public opinion about disposal has also changed, and concerns about long-term cumulative impacts from disposal have come to the forefront of debate. Some members of the public have expressed concern about combustion because air emissions such as mercury and



dioxins that are not completely captured by pollution control equipment may be spread over a broad geographical area, and bio-accumulate in the environment. They argue that contamination from landfills, which are primarily groundwater impacts, can be better contained and more easily cleaned up. Others argue that landfills consume considerable tracts of land and that their air and groundwater impacts are greater over the long run.

DEP has reviewed some of the studies on potential risks from landfills versus combustors, and has found the literature to be inconclusive at this point in time. DEP believes that disposal technologies should be used only as a last resort, and since both combustion and landfilling have potential impacts that are difficult to quantify and compare, no preference should be made between the two. Therefore, to the extent additional disposal capacity is needed, both combustion and landfill projects would be considered to meet this need. Both types of projects would be subject to stringent regulatory standards to minimize their impact on the environment.

## **Permitting Strategy**

Our capacity projections indicate that, even if we increase our waste reduction capacity to meet our milestones, we will still need to permit additional disposal capacity to meet our no net import / no net export goal. In permitting this capacity, we will continue to ensure the protection of public health and the environment and promote an integrated approach to waste management. Key components to our permitting strategy include:

- Requiring disposal facilities to implement Recycling Benefits Plans that lead them to take aggressive actions to increase source reduction, toxicity reduction, and recycling.
- Increasing protection of public health and the environment from solid waste facilities by:
  - Issuing final revised facility siting criteria that provide increased protection for sensitive receptors and resources.
  - Revising the landfill design standards to require a double liner system with leak detection for all new disposal cells.
- Phasing in disposal capacity on a yearly schedule to meet our no net import / no net export goal by 2006.

## **Ensuring That Facilities Help Improve Waste Reduction**

This *Plan* establishes a two-pronged approach to ensuring that facilities help improve waste reduction:

- Through DEP's permitting authority, require disposal facilities to implement Recycling Benefits Plans that lead them to take aggressive actions to increase source reduction and recycling.
- Increase waste ban enforcement.

## Recycling Benefits Plans

The waste services industry is in a unique position to affect how businesses and citizens manage their trash. As service providers, they can educate their customers and provide services and incentives for waste reduction. As handlers of trash, they are also able to ensure that recyclables still in the waste stream are recovered in cases where waste processing is feasible. A key policy of this *Plan* is that over time the waste industry will see its role primarily as providers of waste reduction services, and only secondarily as providers of disposal services.

To encourage this role, DEP will continue to use its regulatory authority to ensure that useful materials are recovered from the waste stream to the maximum feasible extent, as opposed to simply being disposed. This regulatory authority stems from DEP's statutory mandate to protect public health, safety, and the environment through the regulation of solid waste disposal facilities.

DEP will propose changes to 310 CMR 19.000 (the Solid Waste Facility Regulations) that will require disposal facilities, as a condition of their permit, to take additional actions to ensure that the waste they dispose of has had recyclables recovered to the maximum feasible extent. DEP will no longer consider projects that only provide disposal capacity, but will require that projects contribute to increased waste and toxicity reduction. These regulations will set new performance standards which facilities will be held to that are designed to increase the amount of recyclables recovery over time. The revised regulations will replace the current requirement that disposal facilities demonstrate that the MSW recycling rate in their service area is at least 25%.

Specifically, the new regulations would require a Recycling Benefits Plan (RBP) to be included in disposal facility permit applications. The RBP will include:

- a waste composition analysis that will help the facility to determine a baseline amount of recyclables in the waste stream and to identify opportunities for further reductions in the amount of recyclables and hazardous products being disposed, and
- proposed actions the facility will take to decrease the amount of recyclables and hazardous products in waste that is disposed, with a commitment to meet a targeted percentage reduction in the amount of these materials by a specific date. Facilities could also propose activities that lead to source reduction. Future waste composition analyses would be used to track progress in meeting the goals set in the RBP, as well as waste ban inspection monitoring.

Initially, facilities would need to implement actions to ensure that they meet waste ban regulation performance goals. The RBP would require that over time facilities take actions to address more materials than are currently banned from disposal and to go beyond the waste ban performance goals. RBP activities and goals would be set on a facility by facility basis, and would take into account the type of waste received and the sources of the waste.

DEP anticipates developing guidance to help facilities develop acceptable RBPs that would include a menu of recycling and other waste reduction actions that could be implemented



through the RBPs. Options could include providing equipment to municipalities with poor recycling rates (e.g., recycling trucks, bins), staffing a recycling coordinator position for a municipality or service area, preparing and distributing educational materials, establishing a front-end processing facility at the disposal facility or another location, contracting with a third party to process waste, etc. The RBP guidance could also set minimum benefits that must be provided by all facilities, such as regular educational outreach to customers, provision of basic hazardous product collection services, etc.

The requirement to prepare and implement RBPs would apply to permit applications submitted after the effective date of the regulations (public hearings are expected in Fall 2000, with final regulation in early 2001). The regulations would require that by June 30, 2003, all operating disposal facilities implement an RBP, even those that have not needed to apply for an extended or modified permit by that date.

Residuals disposal facilities that meet specific performance standards would not be required to prepare RBPs, since the waste these facilities receive has already been extensively processed for recyclables recovery.

## **Waste Ban Enforcement**

Over the past two years, increasing attention has been drawn to the crucial role the waste ban regulations play in increasing recycling in Massachusetts and preserving disposal capacity. The Recycle 2000 Task Force commissioned by EOEa affirmed DEP's proposal to expand the waste bans to transfer stations (which was done on April 1, 2000) and recommended instituting better DEP oversight as a way to significantly enhance recycling rates. Currently, waste ban enforcement is based on DEP inspections and evaluation of a facility's ability to monitor and inspect incoming waste loads for banned materials.<sup>1</sup> Loads containing unacceptable amounts of these materials "fail" inspection and can be rejected or reloaded, separated for recycling, or in some cases disposed. More oversight and tougher enforcement would encourage facilities and haulers to identify their customers who do not routinely comply with waste bans and work with them to increase recycling through RBPs and other means.

In preparation for the April 2000 waste ban program changes, DEP implemented extensive outreach efforts to raise awareness of waste ban requirements among municipalities, the waste industry, and the business community. In addition, DEP tightened up facility self-monitoring and inspection procedures, instituted a more vigorous record-keeping requirement to enable DEP to better track a facility's compliance with its waste ban plan, and requires facilities to contact haulers and generators who deliver loads with unacceptable amounts of banned material. To continue the momentum of this effort, DEP proposes to:

- Hire 3 – 5 additional staff to conduct waste ban inspections and followup enforcement, and to work with facilities on developing and implementing waste ban plans and RBPs.

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<sup>1</sup> Banned materials include leaves and yard waste; metal, glass, and plastic containers; paper; automobile batteries; tires; white goods; and cathode ray tubes.

- Continue to ensure that facilities are adhering to their waste ban compliance plans and communicating with haulers and generators.
- Ban the disposal of unprocessed C&D debris in 2003.
- Consider expanding the waste ban regulations to include additional recyclable materials not currently banned and lowering waste ban de minimis amounts.

## Phased Disposal Capacity

Permitting disposal capacity must support our primary goal of increasing waste reduction to the maximum extent possible. We expect that requiring disposal facilities to prepare and implement Recycling Benefits Plans, increasing waste ban enforcement, and implementing other ongoing recycling programs will result in significant increases in recycling in the future, and we have based our waste reduction projections on these expectations. However, forecasts of the future are always uncertain, and therefore DEP will phase in additional disposal capacity on a set schedule, allowing for annual adjustments, with the goal of meeting no net import / no net export of waste by 2006. This will allow us to gradually meet our disposal need without over-building capacity if waste reduction capacity increases beyond initial projections.

Table 5-1 shows the total disposal capacity need (municipal solid waste and non-municipal solid waste combined) projected for 2006 after increased waste reduction capacity and the schedule for adding the disposal capacity. In 2006, DEP projects a disposal capacity need of 1.8 million tons. To meet this need over five years, 357,000 tons of additional capacity would be needed each year.

Each year DEP will publish updated solid waste system data and revised waste management capacity projections, including disposal need. Based on this information, DEP may either reduce, increase, or not change the disposal capacity schedule so that we stay on schedule for meeting our no net import / no net export goal. This approach entails DEP making one year commitments for additional disposal capacity, but holding<sup>2</sup> off on future years' commitments until updated solid waste system data are analyzed.

**Table 5-1: Disposal Capacity Schedule**

|                                         | <b>2001</b> | <b>2002</b> | <b>2003</b> | <b>2004</b> | <b>2005</b> | <b>2006</b> |
|-----------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Disposal Capacity Need</b>           | 1,459,577   | 1,837,663   | 1,677,577   | 1,523,912   | 1,842,771   | 1,788,480   |
| <b>Scheduled Capacity</b>               | 357,000     | 357,000     | 357,000     | 357,000     | 357,000     | 0           |
| <b>Scheduled Cumulative Capacity</b>    | 357,000     | 714,000     | 1,071,000   | 1,428,000   | 1,785,000   | 1,785,000   |
| <b>Remaining Disposal Capacity Need</b> | 1,102,577   | 1,123,663   | 606,577     | 95,912      | 57,771      | 3,480       |

<sup>2</sup> Permits issued would not be limited to one year, but would be for the life of the project or landfill phase in question.



Upon finalization of this *Plan*, DEP will solicit permit applications to meet 357,000 tons of disposal capacity for 2001. This capacity will be “reserved” for a project on the date DEP receives an administratively complete permit application. If DEP finds that a permit application is not complete, or later denies a permit application, the reserved capacity will become available for other projects. Once DEP has received applications whose combined requested disposal tonnage meets or would exceed the scheduled capacity for the year, DEP will “park” further permit applications until the next year’s capacity schedule is published. DEP will publish these schedules by June 30<sup>th</sup> of each year.

To help inform the decisions of applicants interested in providing waste reduction capacity as well as disposal capacity, DEP will maintain a publicly available list of permit applications received and the requested annual tonnage in each application. This list will also identify where facilities are in the overall permitting process (e.g., Massachusetts Environmental Policy Act review, site assignment process, or DEP solid waste permit).

Since there is a need for additional disposal capacity over the next five years, disposal projects will be able to proceed through the assignment process.

As in the past, residuals disposal facilities that meet certain performance standards may proceed with permitting outside of DEP’s needs analyses as a way to encourage these types of facilities. Residuals landfills support recycling operations such as C&D processing or MSW/sludge co-composting, and are one of the best methods for ensuring maximum recycling prior to disposal. Capacity requested by such facilities will reduce the annually scheduled capacity available to other projects. They will also be reviewed even if the proposed capacity exceeds disposal capacity scheduled for a given year or for the overall disposal need. By not limiting these facilities to capacity schedules or overall need projections, recycling capacity will increase and future need for non-residual disposal capacity will be reduced.

In addition to residuals disposal facilities, DEP will also maintain flexibility in permitting the following disposal capacity outside of its need analyses (allocation of such capacity will reduce the annually scheduled capacity available to other projects):

- disposal of waste pursuant to enforcement orders;
- disposal of waste pursuant to an approval for a demonstration project or innovative technology;
- disposal of waste necessary to respond to an imminent threat to public health, safety or the environment, including in response to a need for immediate disposal of natural disaster debris;
- disposal of combustion facility ash or contaminated media at dedicated landfills;
- disposal of waste where DEP determines that such disposal is necessary to meet a unique local and/or regional need and the service area meets or has aggressive plans to meet the statewide recycling rate; and

- disposal of MSW waste at residuals landfills and non-MSW landfills where:
  - the MSW is generated within the municipality in which the non-MSW disposal facility is located (host community), the amount of MSW does not exceed 50 tons per day, and the municipality meets or has aggressive plans to meet the statewide average recycling rate; or
  - DEP determines that the site is appropriate to provide reserve MSW disposal capacity.

## **Ensuring That Facilities Operate Safely**

Integral to DEP's mission of protecting public health and the environment is the commitment to increase protection safeguards based on updated scientific information and technology advances. Therefore DEP will promulgate two regulation revisions that would make additional waste management capacity safer.

## **Site Assignment Regulations**

In Spring 1999, DEP held public hearings on proposed changes to the Site Assignment Regulations for Solid Waste Facilities (310 CMR 16.00) intended to provide significantly greater protection for nearby sensitive receptors. These changes would increase many of the setback distances between facilities and various sensitive receptors such as residences, private drinking water wells, and rivers. In addition, the proposed changes would add new setbacks from various types of public lands and conservation areas.

DEP received a significant number of comments both in support of and in opposition to the proposed changes. DEP has prepared a response to these comments and intends to issue the final revisions to the Site Assignment Regulations by August 2000.

The revised Site Assignment Regulations will affect any new site assignment application filed after the effective date of the regulations, but will not affect existing site assignments or site assignment applications submitted to DEP and Boards of Health prior to the effective date.

## **Landfill Design Standards**

In 1990, DEP promulgated landfill design standards in 310 CMR 19.000 that required a composite liner (consisting of two protective layers) as the minimum standard for all new landfill cells. As liner technology has improved, DEP has incorporated improved designs where appropriate in landfill cells proposed since 1990. Based on the development of better designs that are cost effective, DEP will propose to amend 310 CMR 19.000 to require that all new cells use a composite liner with leak detection. The added leak detection layer will allow detection of unacceptable leaks of the primary composite layer and containment of the leak, allowing for repairs to be made. DEP expects to propose regulation revisions at the same time as the revisions requiring Recycling Benefits Plans.



## Reserve Capacity

Beyond yearly updates to its capacity projections, other contingencies may arise that require additional disposal capacity, such as the unforeseen shutdown of a facility. DEP will continue to address contingencies that may arise by temporarily permitting landfills to handle more waste. Existing landfill permits include language specifically indicating that facilities may accept waste on an emergency basis upon application to, and approval from, DEP. This mechanism is needed to temporarily allow landfills to increase the amount of waste they handle to ensure that DEP can quickly and effectively respond to waste disposal emergencies.

Contingencies fall into two basic categories: short-term emergencies such as when one or more combustion facility boilers experience short-term, unscheduled down-time; and longer-term conditions such as when waste generation rates in a given year increase significantly above projected values. In all cases, the Regional Director will be responsible for allocating capacity to meet the emergency. At the discretion of the Regional Director, this capacity may exceed the total permit limit on the amount of waste a facility can take (provided it is within site assignment and MEPA limits). Possible actions include allowing permitted non-MSW capacity to be used for MSW, allowing facilities to temporarily increase the MSW or non-MSW they accept on a daily basis, within annual limits, or in certain circumstances, over annual limits. Capacity emergencies will be addressed by the Regional Director on a case-by-case basis in response to a demonstrated capacity emergency. The process will require substantiation by the affected facility.

## Waste Management Capacity Projection Assumptions

DEP based its projections of future capacity need on three key assumptions which are described below.

**Waste generation is projected to increase 1% per year through 2005, and then to level off.**

In order to plan for disposal capacity, DEP must estimate the amount of waste that will be generated in the future. There is strong evidence that solid waste generation rates are dependent on the economy. When people and businesses have more to spend, they generate more waste. Due to the economic expansion Massachusetts has experienced over the past several years, both total waste and per capita waste generation have increased (between 1997 and 1998, by 4% and 3% respectively).

Since it is impossible to predict future economic conditions with certainty, DEP has adopted a 1% per year increase as a reasonable estimate of future waste increases over the next five years. This is similar to national projections of 1.5% per year increase in MSW generation over the next five years.<sup>3</sup> It is important to note that while a 1% per year increase in generation is a slower rate of increase than historical trends in Massachusetts, a portion of the increases in historical trends can be attributed to better data collection and analysis. After 2005, no increases in waste

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<sup>3</sup> *Characterization of Municipal Solid Waste in the United States: 1998 Update*; Franklin Associates, 1999, page 16.

generation are projected due to increasing uncertainty in forecasting the future and due to expected increased source reduction.

**Total recycling (MSW and non-MSW) is projected to increase to 60% by 2010.**

The combined recycling rate in 2010 in Figure 5-2 is 60% (an increase of 14 percentage points over the 1998 rate of 46%, excluding backyard composting). Although we are not setting specific recycling goals in our overall waste reduction milestone of 70%, our capacity projections need to assume specific future source reduction and recycling rates. Achieving our waste reduction milestones is more important than the mix of recycling and source reduction that contributes to it, although we expect recycling to be in range of 43% - 53% and source reduction to be in the range of 17% - 27%.

*MSW Recycling*

MSW recycling is projected to increase by just over 1% per year, as it has done over the past few years, reaching a rate of 48% in 2010 (up from 31% in 1998, excluding backyard composting). It should be noted that our milestone of 60% MSW waste reduction includes recycling and source reduction. For the purposes of the projection in Figure 5-2, we are assuming 48% MSW recycling and 22% source reduction<sup>4</sup>, which combine to a waste reduction rate of 60%.

*Non-MSW Recycling*

The non-MSW recycling rate (made up entirely of C&D) has remained constant at approximately 70% for the past few years. In Figure 5-3, non-MSW recycling is projected to increase 0.5% per year until 2003, and then to increase 5% per year starting in 2003 (when the proposed ban on disposal of unprocessed C&D takes effect) until reaching a total of 85%. While non-MSW recycling has not seen significant increases in the past few years, it is reasonable to assume increases in this recycling rate because a number of new C&D processors have started operating recently and because DEP will propose in regulation a ban on the disposal of unprocessed C&D beginning in 2003. For the purposes of the projection in Figure 5-2, we are assuming 85% C&D recycling and 19% source reduction<sup>5</sup>, which combine to a waste reduction rate of 88%.

**Disposal capacity is based on current disposal facility permits**

The data used in Figures 5-1 and 5-2 to project disposal capacity are based on existing permits. Appendix E contains a list of active landfills and their currently permitted operational life, and

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<sup>4</sup> The 22% source reduction rate in 2010 is derived by using projected Gross State Product (GSP) to calculate projected generation without source reduction (using a 1990 base year), and then comparing the projected generation to what we project will actually be generated (i.e., generation increasing 1% per year through 2005 followed by a leveling off).

<sup>5</sup> The 19% source reduction rate in 2010 is derived by using projected Gross State Product (GSP) to calculate projected generation without source reduction (using a 1998 base year), and then comparing the projected generation to what we project will actually be generated (i.e., generation increasing 1% per year through 2005 followed by a leveling off).



Appendix F contains a list of currently permitted combustors. Waste management capacity shortfall is calculated as projected waste generation minus recycling minus permitted disposal capacity. It is important to note that the loss of landfill disposal capacity over time in Figures 5-1 and 5-2 is in many cases the result of permit expirations for current landfill cells, and not because the landfills have run out of airspace for taking additional waste. A number of landfills are planning expansions into new cells as part of their overall design life.

TABLE 5-2

**Baseline Waste Management Capacity Projections (in tons) 2000-2010**

|                                               | 2000              | 2001              | 2002             | 2003             | 2004             | 2005             | 2006             | 2007             | 2008             | 2009             | 2010             |
|-----------------------------------------------|-------------------|-------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Total Generation w/out Source Reduction       | 12,764,688        | 13,140,100        | 13,416,388       | 13,735,724       | 14,086,779       | 14,454,576       | 14,838,547       | 15,140,575       | 15,457,079       | 15,784,030       | 16,112,240       |
| MSW Generation w/out Source Reduction         | 8,058,638         | 8,295,644         | 8,470,071        | 8,671,675        | 8,893,304        | 9,125,503        | 9,367,912        | 9,558,590        | 9,758,406        | 9,964,817        | 10,172,024       |
| Non-MSW Generation w/out Source Reduction     | 4,706,050         | 4,844,456         | 4,946,317        | 5,064,049        | 5,193,475        | 5,329,073        | 5,470,635        | 5,581,986        | 5,698,673        | 5,819,213        | 5,940,216        |
| <b>Baseline Management Capacity</b>           | <b>10,385,260</b> | <b>10,348,815</b> | <b>9,957,326</b> | <b>9,890,721</b> | <b>9,811,981</b> | <b>9,350,920</b> | <b>9,293,346</b> | <b>9,199,519</b> | <b>9,110,599</b> | <b>9,110,599</b> | <b>9,110,599</b> |
| MSW Management Capacity                       | 6,415,091         | 6,413,096         | 6,135,422        | 6,036,310        | 6,043,652        | 5,716,848        | 5,703,625        | 5,609,975        | 5,598,415        | 5,598,415        | 5,598,415        |
| Non-MSW Management Capacity                   | 3,970,169         | 3,935,719         | 3,821,904        | 3,854,411        | 3,768,329        | 3,634,072        | 3,589,721        | 3,589,544        | 3,512,184        | 3,512,184        | 3,512,184        |
| Baseline MSW Recycling                        | 2,333,471         | 2,356,805         | 2,380,373        | 2,404,177        | 2,428,219        | 2,452,501        | 2,452,501        | 2,452,501        | 2,452,501        | 2,452,501        | 2,452,501        |
| Baseline Non-MSW Recycling                    | 3,186,645         | 3,218,512         | 3,250,697        | 3,283,204        | 3,316,036        | 3,349,196        | 3,349,196        | 3,349,196        | 3,349,196        | 3,349,196        | 3,349,196        |
| Currently Permitted Total Landfill Capacity   | 1,864,265         | 1,772,619         | 1,325,377        | 1,202,461        | 1,066,847        | 548,344          | 490,769          | 396,943          | 308,023          | 308,023          | 308,023          |
| Currently Permitted MSW Landfill Capacity     | 1,080,741         | 1,055,412         | 754,170          | 631,254          | 614,554          | 263,468          | 250,245          | 156,595          | 145,035          | 145,035          | 145,035          |
| Currently Permitted Non-MSW Landfill Capacity | 783,524           | 717,207           | 571,207          | 571,207          | 452,293          | 284,876          | 240,525          | 240,348          | 162,988          | 162,988          | 162,988          |
| Currently Permitted Combustion Capacity       | 3,000,879         | 3,000,879         | 3,000,879        | 3,000,879        | 3,000,879        | 3,000,879        | 3,000,879        | 3,000,879        | 3,000,879        | 3,000,879        | 3,000,879        |
| <b>Management Need</b>                        | <b>2,379,429</b>  | <b>2,791,285</b>  | <b>3,459,062</b> | <b>3,845,003</b> | <b>4,274,799</b> | <b>5,103,656</b> | <b>5,545,201</b> | <b>5,941,056</b> | <b>6,346,480</b> | <b>6,673,431</b> | <b>7,001,641</b> |

**Waste Management Capacity Allocation (in tons) 2000-2010**

|                                                | 2000             | 2001             | 2002             | 2003             | 2004             | 2005             | 2006              | 2007             | 2008             | 2009             | 2010             |
|------------------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|------------------|------------------|------------------|------------------|
| <b>Management Need</b>                         | <b>2,379,429</b> | <b>2,791,285</b> | <b>3,459,062</b> | <b>3,845,003</b> | <b>4,274,799</b> | <b>5,103,656</b> | <b>5,545,201</b>  | <b>5,941,056</b> | <b>6,346,480</b> | <b>6,673,431</b> | <b>7,001,641</b> |
| <b>Total Source Reduction</b>                  | <b>685,014</b>   | <b>939,629</b>   | <b>1,093,912</b> | <b>1,290,023</b> | <b>1,516,622</b> | <b>1,758,716</b> | <b>2,142,687</b>  | <b>2,444,716</b> | <b>2,761,220</b> | <b>3,088,171</b> | <b>3,416,381</b> |
| MSW Source Reduction                           | 531,314          | 693,047          | 791,447          | 916,265          | 1,060,340        | 1,214,209        | 1,456,619         | 1,647,296        | 1,847,112        | 2,053,524        | 2,260,730        |
| Non-MSW Source Reduction                       | 153,700          | 246,582          | 302,464          | 373,758          | 456,281          | 544,507          | 686,069           | 797,420          | 914,107          | 1,034,647        | 1,155,650        |
| <b>Total Additional Recycling</b>              | <b>258,547</b>   | <b>392,079</b>   | <b>527,487</b>   | <b>877,403</b>   | <b>1,234,265</b> | <b>1,502,169</b> | <b>1,614,034</b>  | <b>1,726,375</b> | <b>1,837,924</b> | <b>1,950,264</b> | <b>2,062,605</b> |
| Additional MSW Recycling                       | 213,023          | 323,110          | 434,610          | 549,083          | 665,802          | 784,484          | 896,350           | 1,008,690        | 1,120,239        | 1,232,580        | 1,344,920        |
| Additional Non-MSW Recycling                   | 45,524           | 68,968           | 92,877           | 328,320          | 568,463          | 717,685          | 717,685           | 717,685          | 717,685          | 717,685          | 717,685          |
| <b>Cumulative Additional Disposal Capacity</b> | <b>0</b>         | <b>360,000</b>   | <b>720,000</b>   | <b>1,080,000</b> | <b>1,440,000</b> | <b>1,800,000</b> | <b>*1,788,479</b> | <b>1,769,965</b> | <b>1,747,336</b> | <b>1,634,996</b> | <b>1,522,655</b> |
| <b>Projected Export</b>                        | <b>1,435,868</b> | <b>1,099,577</b> | <b>1,117,663</b> | <b>597,577</b>   | <b>83,912</b>    | <b>42,771</b>    | <b>0</b>          | <b>0</b>         | <b>0</b>         | <b>0</b>         | <b>0</b>         |

\*some amount of capacity permitted would begin to expire





## Appendix A

### Data Collection and Analysis

This Appendix describes how DEP collects and analyzes data.

#### Data Collection

Table A-1 shows the sources DEP relies on to track solid waste data. Each of the data sources is described below.

**Table A-1: Major Solid Waste Data Sources**

| Data Type         | Data Source                                                                                                                                                               |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Disposal          | <ul style="list-style-type: none"> <li>• Annual Facility Reports</li> </ul>                                                                                               |
| Imports / Exports | <ul style="list-style-type: none"> <li>• Annual Facility Reports</li> <li>• Survey of Other States</li> </ul>                                                             |
| MSW Recycling     | <ul style="list-style-type: none"> <li>• Survey of Commercial Recycling Processors</li> <li>• Survey of Municipalities</li> <li>• Bottle Bill Tonnage</li> </ul>          |
| Composting        | <ul style="list-style-type: none"> <li>• Composting Facility Reports</li> <li>• Survey of Municipalities</li> <li>• Residential Organic Waste Management Study</li> </ul> |
| C&D Recycling     | <ul style="list-style-type: none"> <li>• Survey of C&amp;D Processors</li> </ul>                                                                                          |

#### *Annual Facility Reports*

In Massachusetts, all landfills, combustion facilities, and transfer stations must submit annual reports to DEP summarizing the type and quantity of waste managed. Data from the landfill and combustion facility reports provide information regarding total tonnage of waste disposed in Massachusetts. The reports also contain information on the import and export of waste.

#### *Survey of Other States*

In addition to using Annual Facility Reports, DEP gathers information on the import and export of solid waste across state lines by contacting neighboring state solid waste management agencies and significant out-of-state facilities. DEP compares amounts from each of these sources and the largest import/export amount is used.



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### *Municipal Recycling Survey*

Each year, DEP surveys all 351 cities and towns in the Commonwealth to determine the quantity of waste recycled through municipal recycling programs. Recyclables counted are generated by single-family homes and some multi-family residences. In FY1999, DEP received complete data from 313 municipalities and used the information to calculate the residential generation and recycling of municipal solid waste for calendar year 1998. The survey also collects data on centralized (off-site) composting of leaf and yard waste that is used to determine the amount of residential composting<sup>1</sup> taking place at municipal and commercial composting facilities. DEP adjusts centralized composting of leaf and yard waste to account for non-reporting towns that operate leaf and yard waste collection programs.

Appendix B (MSW Management Overview by Municipality) provides data on each town's generation and recycling tonnage. DEP does not adjust reported recycling tonnages to account for municipalities who did not report or whose data is incomplete. However, DEP does estimate waste generation for these municipalities. DEP uses a regression analysis based on the towns that do report and multiplies the resulting index of the amount of per capita waste generated (.40 tons per year) by the population of each town lacking generation data.

### *Composting Facility Reports*

Each year, DEP sends a composting survey to all municipal and commercial composting sites. This survey provides the total centralized composting tonnage. For sites that do not submit reports, DEP assigns tonnage based on average tons composted derived from reporting sites. To derive a base commercial composting<sup>2</sup> amount, the total amount of residential composting from the municipal recycling survey is subtracted from the total amount reported on the composting facility reports. 100,000 tons is added to the base commercial composting amount to account for farm composting which is not reported to DEP. This figure is an estimate from the Massachusetts Department of Food and Agriculture (DFA).

### *MSW Recycling Processors Survey*

DEP collected 1998 MSW recycling processors data in two ways. DEP contacted roughly 20 of the state's largest processors by telephone that resulted in direct reporting of a significant portion of the recycled materials. DEP estimated a smaller portion of materials managed by

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<sup>1</sup> Composting tonnage is considered residential if it originates from a residential source, regardless of where it is composted.

<sup>2</sup> Composting tonnage is considered commercial if it originates from a commercial source, regardless of where it is composted.

## APPENDIX B

### MSW Management Overview By Municipality

| Municipality | MSW Recycled: Glass,<br>Metal, Paper, Plastic<br>and Textiles | MSW<br>Disposed | MSW Generation<br>Rate*<br>tons/person/year | Estimated<br>Population | MSW<br>Generation*<br>(Recycled + Disposed) |
|--------------|---------------------------------------------------------------|-----------------|---------------------------------------------|-------------------------|---------------------------------------------|
| ABINGTON     | 1,035                                                         | 6,176           | 0.51                                        | 14,263                  | 7,211                                       |
| ACTON        | 2,400                                                         | 3,708           | 0.34                                        | 18,143                  | 6,108                                       |
| ACUSHNET     | 313                                                           | 3,905           | 0.43                                        | 9,907                   | 4,218                                       |
| ADAMS        | 0                                                             | 0               | 0.40                                        | 9,108                   | 3,643                                       |
| AGAWAM       | 2,249                                                         | 9,280           | 0.42                                        | 27,536                  | 11,529                                      |
| ALFORD       | 63                                                            | 204             | 0.63                                        | 425                     | 267                                         |
| AMESBURY     | 716                                                           | 4,146           | 0.31                                        | 15,520                  | 4,862                                       |
| AMHERST      | 2,495                                                         | 2,867           | 0.15                                        | 36,504                  | 5,362                                       |
| ANDOVER      | 2,922                                                         | 11,653          | 0.45                                        | 32,199                  | 14,575                                      |
| ARLINGTON    | 5,475                                                         | 19,081          | 0.56                                        | 43,587                  | 24,556                                      |
| ASHBURNHAM   | 352                                                           | 467             | 0.13                                        | 6,072                   | 819                                         |
| ASHBY        | 0                                                             | 0               | 0.40                                        | 2,934                   | 1,174                                       |
| ASHFIELD     | 249                                                           | 476             | 0.40                                        | 1,811                   | 725                                         |
| ASHLAND      | 1,387                                                         | 5,248           | 0.47                                        | 14,240                  | 6,635                                       |
| ATHOL        | 0                                                             | 0               | 0.40                                        | 11,917                  | 4,767                                       |
| ATTLEBORO    | 2,906                                                         | 12,560          | 0.38                                        | 41,103                  | 15,466                                      |
| AUBURN       | 672                                                           | 4,710           | 0.35                                        | 15,532                  | 5,382                                       |
| AVON         | 313                                                           | 1,796           | 0.47                                        | 4,485                   | 2,109                                       |
| AYER         | 411                                                           | 1,982           | 0.34                                        | 7,015                   | 2,393                                       |
| BARNSTABLE   | 2,252                                                         | 21,188          | 0.53                                        | 44,230                  | 23,440                                      |
| BARRE        | 292                                                           | 2,497           | 0.58                                        | 4,847                   | 2,789                                       |
| BECKET       | 173                                                           | 377             | 0.29                                        | 1,900                   | 550                                         |
| BEDFORD      | 1,745                                                         | 4,988           | 0.51                                        | 13,272                  | 6,733                                       |
| BELCHERTOWN  | 555                                                           | 1,003           | 0.12                                        | 13,200                  | 1,558                                       |
| BELLINGHAM   | 1,179                                                         | 5,850           | 0.45                                        | 15,467                  | 7,029                                       |
| BELMONT      | 3,046                                                         | 10,133          | 0.52                                        | 25,349                  | 13,179                                      |
| BERKLEY      | 443                                                           | 979             | 0.28                                        | 5,114                   | 1,422                                       |
| BERLIN       | 206                                                           | 610             | 0.35                                        | 2,348                   | 816                                         |
| BERNARDSTON  | 196                                                           | 290             | 0.23                                        | 2,154                   | 486                                         |
| BEVERLY      | 3,177                                                         | 18,333          | 0.56                                        | 38,713                  | 21,510                                      |
| BILLERICA    | 2,240                                                         | 16,892          | 0.49                                        | 38,937                  | 19,132                                      |
| BLACKSTONE   | 221                                                           | 3,492           | 0.42                                        | 8,788                   | 3,713                                       |
| BLANDFORD    | 168                                                           | 0               | 0.40                                        | 1,259                   | 504                                         |
| BOLTON       | 595                                                           | 1,275           | 0.51                                        | 3,651                   | 1,870                                       |
| BOSTON       | 24,119                                                        | 247,795         | 0.47                                        | 574,283                 | 271,914                                     |
| BOURNE       | 2,084                                                         | 5,120           | 0.42                                        | 17,040                  | 7,204                                       |
| BOXBOROUGH   | 350                                                           | 992             | 0.39                                        | 3,452                   | 1,342                                       |
| BOXFORD      | 1,175                                                         | 1,850           | 0.38                                        | 7,900                   | 3,025                                       |
| BOYLSTON     | 0                                                             | 0               | 0.40                                        | 3,641                   | 1,456                                       |
| BRAINTREE    | 2,980                                                         | 14,809          | 0.53                                        | 33,836                  | 17,789                                      |
| BREWSTER     | 1,002                                                         | 6,921           | 0.95                                        | 8,364                   | 7,923                                       |

\* Generation for non-reporting municipalities is based on a default estimated generation rate. The default estimated generation rate is 0.40, which does not include composted waste.



| <b>Municipality</b> | <b>MSW Recycled: Glass,<br/>Metal, Paper, Plastic<br/>and Textiles</b> | <b>MSW<br/>Disposed</b> | <b>MSW Generation<br/>Rate*<br/>tons/person/year</b> | <b>Estimated<br/>Population</b> | <b>MSW<br/>Generation*<br/>(Recycled + Disposed)</b> |
|---------------------|------------------------------------------------------------------------|-------------------------|------------------------------------------------------|---------------------------------|------------------------------------------------------|
| BRIDGEWATER         | 377                                                                    | 0                       | 0.40                                                 | 23,331                          | 9,332                                                |
| BRIMFIELD           | 151                                                                    | 365                     | 0.16                                                 | 3,135                           | 516                                                  |
| BROCKTON            | 3,883                                                                  | 36,069                  | 0.42                                                 | 95,994                          | 39,952                                               |
| BROOKFIELD          | 364                                                                    | 1,000                   | 0.43                                                 | 3,159                           | 1,364                                                |
| BROOKLINE           | 4,639                                                                  | 13,810                  | 0.33                                                 | 55,407                          | 18,449                                               |
| BUCKLAND            | 180                                                                    | 298                     | 0.24                                                 | 1,967                           | 478                                                  |
| BURLINGTON          | 1,912                                                                  | 8,490                   | 0.46                                                 | 22,739                          | 10,402                                               |
| CAMBRIDGE           | 7,844                                                                  | 22,460                  | 0.30                                                 | 99,858                          | 30,304                                               |
| CANTON              | 1,354                                                                  | 7,621                   | 0.48                                                 | 18,725                          | 8,975                                                |
| CARLISLE            | 766                                                                    | 1,929                   | 0.57                                                 | 4,700                           | 2,695                                                |
| CARVER              | 0                                                                      | 0                       | 0.40                                                 | 11,843                          | 4,737                                                |
| CHARLEMONT          | 104                                                                    | 211                     | 0.24                                                 | 1,294                           | 315                                                  |
| CHARLTON            | 144                                                                    | 0                       | 0.40                                                 | 12,055                          | 4,822                                                |
| CHATHAM             | 1,213                                                                  | 4,640                   | 0.89                                                 | 6,579                           | 5,853                                                |
| CHELMSFORD          | 3,414                                                                  | 14,503                  | 0.54                                                 | 33,414                          | 17,917                                               |
| CHELSEA             | 580                                                                    | 10,228                  | 0.38                                                 | 28,222                          | 10,808                                               |
| CHESHIRE            | 250                                                                    | 967                     | 0.34                                                 | 3,619                           | 1,217                                                |
| CHESTER             | 0                                                                      | 0                       | 0.40                                                 | 1,317                           | 527                                                  |
| CHESTERFIELD        | 87                                                                     | 182                     | 0.26                                                 | 1,048                           | 269                                                  |
| CHICOPEE            | 3,324                                                                  | 17,691                  | 0.36                                                 | 57,887                          | 21,015                                               |
| CHILMARK            | 221                                                                    | 649                     | 1.30                                                 | 671                             | 870                                                  |
| CLARKSBURG          | 520                                                                    | 1,323                   | 1.02                                                 | 1,802                           | 1,843                                                |
| CLINTON             | 0                                                                      | 0                       | 0.40                                                 | 13,593                          | 5,437                                                |
| COHASSET            | 1,105                                                                  | 2,934                   | 0.56                                                 | 7,152                           | 4,039                                                |
| COLRAIN             | 257                                                                    | 230                     | 0.28                                                 | 1,750                           | 487                                                  |
| CONCORD             | 1,714                                                                  | 2,352                   | 0.26                                                 | 15,423                          | 4,066                                                |
| CONWAY              | 251                                                                    | 489                     | 0.41                                                 | 1,800                           | 740                                                  |
| CUMMINGTON          | 96                                                                     | 371                     | 0.58                                                 | 802                             | 467                                                  |
| DALTON              | 459                                                                    | 1,119                   | 0.22                                                 | 7,245                           | 1,578                                                |
| DANVERS             | 1,739                                                                  | 13,219                  | 0.61                                                 | 24,339                          | 14,958                                               |
| DARTMOUTH           | 1,279                                                                  | 10,937                  | 0.44                                                 | 28,017                          | 12,216                                               |
| DEDHAM              | 1,637                                                                  | 9,680                   | 0.48                                                 | 23,411                          | 11,317                                               |
| DEERFIELD           | 497                                                                    | 1,825                   | 0.44                                                 | 5,238                           | 2,322                                                |
| DENNIS              | 2,313                                                                  | 9,233                   | 0.82                                                 | 14,000                          | 11,546                                               |
| DIGHTON             | 584                                                                    | 1,050                   | 0.28                                                 | 5,739                           | 1,634                                                |
| DOUGLAS             | 193                                                                    | 0                       | 0.40                                                 | 6,024                           | 2,410                                                |
| DOVER               | 634                                                                    | 2,268                   | 0.51                                                 | 5,730                           | 2,902                                                |
| DRACUT              | 2,138                                                                  | 10,300                  | 0.45                                                 | 27,939                          | 12,438                                               |
| DUDLEY              | 269                                                                    | 730                     | 0.10                                                 | 9,938                           | 999                                                  |
| DUNSTABLE           | 255                                                                    | 475                     | 0.29                                                 | 2,500                           | 730                                                  |
| DUXBURY             | 1,819                                                                  | 6,171                   | 0.55                                                 | 14,403                          | 7,990                                                |
| EAST BRIDGEWATER    | 0                                                                      | 0                       | 0.40                                                 | 11,814                          | 4,726                                                |
| EAST BROOKFIELD     | 170                                                                    | 657                     | 0.39                                                 | 2,131                           | 827                                                  |
| EAST LONGMEADOW     | 1,538                                                                  | 4,371                   | 0.40                                                 | 14,903                          | 5,909                                                |
| EASTHAM             | 515                                                                    | 3,969                   | 0.87                                                 | 5,182                           | 4,484                                                |
| EASTHAMPTON         | 764                                                                    | 2,368                   | 0.20                                                 | 16,000                          | 3,132                                                |
| EASTON              | 1,217                                                                  | 2,500                   | 0.17                                                 | 21,281                          | 3,717                                                |

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| <b>Municipality</b> | <b>MSW Recycled: Glass,<br/>Metal, Paper, Plastic<br/>and Textiles</b> | <b>MSW<br/>Disposed</b> | <b>MSW Generation<br/>Rate*<br/>tons/person/year</b> | <b>Estimated<br/>Population</b> | <b>MSW<br/>Generation*<br/>(Recycled + Disposed)</b> |
|---------------------|------------------------------------------------------------------------|-------------------------|------------------------------------------------------|---------------------------------|------------------------------------------------------|
| EDGARTOWN           | 1,000                                                                  | 2,924                   | 1.25                                                 | 3,138                           | 3,924                                                |
| EGREMONT            | 299                                                                    | 625                     | 0.89                                                 | 1,040                           | 924                                                  |
| ERVING              | 192                                                                    | 407                     | 0.42                                                 | 1,421                           | 599                                                  |
| ESSEX               | 397                                                                    | 1,113                   | 0.45                                                 | 3,393                           | 1,510                                                |
| EVERETT             | 1,088                                                                  | 18,873                  | 0.56                                                 | 35,732                          | 19,961                                               |
| FAIRHAVEN           | 802                                                                    | 5,530                   | 0.38                                                 | 16,458                          | 6,332                                                |
| FALL RIVER          | 1,339                                                                  | 32,760                  | 0.36                                                 | 94,412                          | 34,099                                               |
| FALMOUTH            | 3,519                                                                  | 15,596                  | 0.65                                                 | 29,585                          | 19,115                                               |
| FITCHBURG           | 1,635                                                                  | 13,393                  | 0.39                                                 | 39,000                          | 15,028                                               |
| FLORIDA             | 34                                                                     | 331                     | 0.47                                                 | 774                             | 365                                                  |
| FOXBOROUGH          | 0                                                                      | 0                       | 0.40                                                 | 16,044                          | 6,418                                                |
| FRAMINGHAM          | 4,036                                                                  | 0                       | 0.40                                                 | 65,904                          | 26,362                                               |
| FRANKLIN            | 2,828                                                                  | 8,880                   | 0.41                                                 | 28,500                          | 11,708                                               |
| FREETOWN            | 144                                                                    | 2,886                   | 0.33                                                 | 9,069                           | 3,030                                                |
| GARDNER             | 813                                                                    | 6,353                   | 0.34                                                 | 21,197                          | 7,166                                                |
| GAY HEAD            | 73                                                                     | 217                     | 1.39                                                 | 209                             | 290                                                  |
| GEORGETOWN          | 0                                                                      | 0                       | 0.40                                                 | 6,720                           | 2,688                                                |
| GILL                | 96                                                                     | 196                     | 0.18                                                 | 1,583                           | 292                                                  |
| GLOUCESTER          | 2,263                                                                  | 9,620                   | 0.41                                                 | 28,931                          | 11,883                                               |
| GOSHEN              | 60                                                                     | 111                     | 0.20                                                 | 862                             | 171                                                  |
| GOSNOLD             | 0                                                                      | 0                       | 0.40                                                 | 96                              | 38                                                   |
| GRAFTON             | 0                                                                      | 0                       | 0.40                                                 | 13,883                          | 5,553                                                |
| GRANBY              | 765                                                                    | 6,086                   | 1.23                                                 | 5,565                           | 6,851                                                |
| GRANVILLE           | 125                                                                    | 194                     | 0.22                                                 | 1,441                           | 319                                                  |
| GREAT BARRINGTON    | 944                                                                    | 0                       | 0.40                                                 | 7,740                           | 3,096                                                |
| GREENFIELD          | 2,122                                                                  | 5,030                   | 0.38                                                 | 18,825                          | 7,152                                                |
| GROTON              | 1,007                                                                  | 2,198                   | 0.37                                                 | 8,750                           | 3,205                                                |
| GROVELAND           | 0                                                                      | 2,026                   | 0.40                                                 | 5,454                           | 2,182                                                |
| HADLEY              | 690                                                                    | 598                     | 0.31                                                 | 4,117                           | 1,288                                                |
| HALIFAX             | 400                                                                    | 999                     | 0.19                                                 | 7,200                           | 1,399                                                |
| HAMILTON            | 660                                                                    | 2,852                   | 0.46                                                 | 7,683                           | 3,512                                                |
| HAMPDEN             | 254                                                                    | 956                     | 0.26                                                 | 4,674                           | 1,210                                                |
| HANCOCK             | 56                                                                     | 242                     | 0.44                                                 | 681                             | 298                                                  |
| HANOVER             | 1,446                                                                  | 6,314                   | 0.63                                                 | 12,400                          | 7,760                                                |
| HANSON              | 0                                                                      | 0                       | 0.40                                                 | 9,366                           | 3,746                                                |
| HARDWICK            | 220                                                                    | 0                       | 0.40                                                 | 2,799                           | 1,120                                                |
| HARVARD             | 680                                                                    | 1,982                   | 0.21                                                 | 12,543                          | 2,662                                                |
| HARWICH             | 1,582                                                                  | 3,811                   | 0.48                                                 | 11,200                          | 5,393                                                |
| HATFIELD            | 231                                                                    | 0                       | 0.40                                                 | 3,224                           | 1,290                                                |
| HAVERHILL           | 2,878                                                                  | 25,638                  | 0.52                                                 | 54,720                          | 28,516                                               |
| HAWLEY              | 0                                                                      | 0                       | 0.40                                                 | 336                             | 134                                                  |
| HEATH               | 67                                                                     | 225                     | 0.36                                                 | 821                             | 292                                                  |
| HINGHAM             | 2,442                                                                  | 9,500                   | 0.59                                                 | 20,385                          | 11,942                                               |
| HINSDALE            | 142                                                                    | 834                     | 0.43                                                 | 2,267                           | 976                                                  |
| HOLBROOK            | 787                                                                    | 3,475                   | 0.38                                                 | 11,205                          | 4,262                                                |
| HOLDEN              | 1,104                                                                  | 5,150                   | 0.41                                                 | 15,082                          | 6,254                                                |
| HOLLAND             | 0                                                                      | 0                       | 0.40                                                 | 2,280                           | 912                                                  |

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|---------------------|------------------------------------------------------------------------|-------------------------|------------------------------------------------------|---------------------------------|------------------------------------------------------|
| HOLLISTON           | 1,540                                                                  | 5,183                   | 0.51                                                 | 13,152                          | 6,723                                                |
| HOLYOKE             | 1,608                                                                  | 10,700                  | 0.27                                                 | 46,324                          | 12,308                                               |
| HOPEDALE            | 483                                                                    | 1,577                   | 0.37                                                 | 5,584                           | 2,060                                                |
| HOPKINTON           | 911                                                                    | 4,687                   | 0.45                                                 | 12,350                          | 5,598                                                |
| HUBBARDSTON         | 138                                                                    | 0                       | 0.40                                                 | 3,768                           | 1,507                                                |
| HUDSON              | 0                                                                      | 0                       | 0.40                                                 | 17,770                          | 7,108                                                |
| HULL                | 112                                                                    | 0                       | 0.40                                                 | 11,125                          | 4,450                                                |
| HUNTINGTON          | 179                                                                    | 463                     | 0.30                                                 | 2,120                           | 642                                                  |
| IPSWICH             | 1,297                                                                  | 4,640                   | 0.45                                                 | 13,132                          | 5,937                                                |
| KINGSTON            | 871                                                                    | 4,470                   | 0.52                                                 | 10,227                          | 5,341                                                |
| LAKEVILLE           | 756                                                                    | 1,421                   | 0.25                                                 | 8,884                           | 2,177                                                |
| LANCASTER           | 1,288                                                                  | 0                       | 0.40                                                 | 5,892                           | 2,357                                                |
| LANESBOROUGH        | 136                                                                    | 0                       | 0.40                                                 | 3,039                           | 1,216                                                |
| LAWRENCE            | 1,258                                                                  | 29,980                  | 0.44                                                 | 70,207                          | 31,238                                               |
| LEE                 | 857                                                                    | 0                       | 0.40                                                 | 6,247                           | 2,499                                                |
| LEICESTER           | 927                                                                    | 0                       | 0.40                                                 | 10,731                          | 4,292                                                |
| LENOX               | 630                                                                    | 0                       | 0.40                                                 | 5,663                           | 2,265                                                |
| LEOMINSTER          | 3,213                                                                  | 13,100                  | 0.41                                                 | 40,271                          | 16,313                                               |
| LEVERETT            | 211                                                                    | 284                     | 0.26                                                 | 1,926                           | 495                                                  |
| LEXINGTON           | 4,237                                                                  | 11,307                  | 0.49                                                 | 31,545                          | 15,544                                               |
| LEYDEN              | 1                                                                      | 0                       | 0.40                                                 | 683                             | 273                                                  |
| LINCOLN             | 764                                                                    | 1,916                   | 0.51                                                 | 5,249                           | 2,680                                                |
| LITTLETON           | 756                                                                    | 2,458                   | 0.44                                                 | 7,251                           | 3,214                                                |
| LONGMEADOW          | 1,842                                                                  | 4,778                   | 0.44                                                 | 15,032                          | 6,620                                                |
| LOWELL              | 9,405                                                                  | 41,344                  | 0.49                                                 | 103,435                         | 50,749                                               |
| LUDLOW              | 1,404                                                                  | 7,962                   | 0.50                                                 | 18,600                          | 9,366                                                |
| LUNENBURG           | 0                                                                      | 0                       | 0.40                                                 | 9,439                           | 3,776                                                |
| LYNN                | 1,672                                                                  | 35,220                  | 0.45                                                 | 82,000                          | 36,892                                               |
| LYNNFIELD           | 1,166                                                                  | 4,142                   | 0.47                                                 | 11,327                          | 5,308                                                |
| MALDEN              | 2,167                                                                  | 25,347                  | 0.50                                                 | 55,233                          | 27,514                                               |
| MANCHESTER          | 793                                                                    | 2,375                   | 0.57                                                 | 5,569                           | 3,168                                                |
| MANSFIELD           | 1,366                                                                  | 5,853                   | 0.35                                                 | 20,400                          | 7,219                                                |
| MARBLEHEAD          | 0                                                                      | 0                       | 0.40                                                 | 20,255                          | 8,102                                                |
| MARION              | 409                                                                    | 4,106                   | 0.90                                                 | 5,026                           | 4,515                                                |
| MARLBOROUGH         | 1,023                                                                  | 15,183                  | 0.49                                                 | 33,032                          | 16,206                                               |
| MARSHFIELD          | 2,533                                                                  | 11,529                  | 0.63                                                 | 22,165                          | 14,062                                               |
| MASHPEE             | 523                                                                    | 7,243                   | 0.63                                                 | 12,301                          | 7,766                                                |
| MATTAPOISETT        | 473                                                                    | 2,519                   | 0.50                                                 | 5,955                           | 2,992                                                |
| MAYNARD             | 1,259                                                                  | 2,773                   | 0.37                                                 | 10,772                          | 4,032                                                |
| MEDFIELD            | 1,220                                                                  | 6,710                   | 0.64                                                 | 12,400                          | 7,930                                                |
| MEDFORD             | 3,250                                                                  | 27,494                  | 0.54                                                 | 57,407                          | 30,744                                               |
| MEDWAY              | 1,373                                                                  | 3,907                   | 0.44                                                 | 12,100                          | 5,280                                                |
| MELROSE             | 1,954                                                                  | 10,100                  | 0.44                                                 | 27,114                          | 12,054                                               |
| MENDON              | 402                                                                    | 1,560                   | 0.39                                                 | 5,000                           | 1,962                                                |
| MERRIMAC            | 402                                                                    | 881                     | 0.22                                                 | 5,850                           | 1,283                                                |
| METHUEN             | 2,251                                                                  | 14,894                  | 0.41                                                 | 41,731                          | 17,145                                               |
| MIDDLEBOROUGH       | 1,104                                                                  | 8,481                   | 0.51                                                 | 18,754                          | 9,585                                                |

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|---------------------|------------------------------------------------------------------------|-------------------------|------------------------------------------------------|---------------------------------|------------------------------------------------------|
| MIDDLEFIELD         | 47                                                                     | 151                     | 0.50                                                 | 394                             | 198                                                  |
| MIDDLETON           | 410                                                                    | 1,757                   | 0.33                                                 | 6,534                           | 2,167                                                |
| MILFORD             | 1,974                                                                  | 7,008                   | 0.34                                                 | 26,617                          | 8,982                                                |
| MILLBURY            | 1,588                                                                  | 5,280                   | 0.56                                                 | 12,228                          | 6,868                                                |
| MILLIS              | 298                                                                    | 1,174                   | 0.19                                                 | 7,700                           | 1,472                                                |
| MILLVILLE           | 249                                                                    | 950                     | 0.40                                                 | 3,000                           | 1,199                                                |
| MILTON              | 3,430                                                                  | 8,470                   | 0.46                                                 | 25,803                          | 11,900                                               |
| MONROE              | 9                                                                      | 5                       | 0.12                                                 | 114                             | 14                                                   |
| MONSON              | 567                                                                    | 2,157                   | 0.34                                                 | 7,974                           | 2,724                                                |
| MONTAGUE            | 844                                                                    | 2,113                   | 0.35                                                 | 8,492                           | 2,957                                                |
| MONTEREY            | 166                                                                    | 271                     | 0.52                                                 | 842                             | 437                                                  |
| MONTGOMERY          | 0                                                                      | 0                       | 0.40                                                 | 759                             | 304                                                  |
| MOUNT WASHINGTON    | 40                                                                     | 67                      | 0.79                                                 | 135                             | 107                                                  |
| NAHANT              | 315                                                                    | 1,720                   | 0.55                                                 | 3,691                           | 2,035                                                |
| NANTUCKET           | 3,168                                                                  | 7,854                   | 1.67                                                 | 6,600                           | 11,022                                               |
| NATICK              | 3,053                                                                  | 9,385                   | 0.40                                                 | 31,182                          | 12,438                                               |
| NEEDHAM             | 4,806                                                                  | 11,420                  | 0.56                                                 | 29,156                          | 16,226                                               |
| NEW ASHFORD         | 0                                                                      | 0                       | 0.40                                                 | 192                             | 77                                                   |
| NEW BEDFORD         | 2,504                                                                  | 42,804                  | 0.45                                                 | 99,922                          | 45,308                                               |
| NEW BRAINTREE       | 163                                                                    | 0                       | 0.40                                                 | 926                             | 370                                                  |
| NEW MARLBOROUGH     | 0                                                                      | 0                       | 0.40                                                 | 1,243                           | 497                                                  |
| NEW SALEM           | 83                                                                     | 200                     | 0.32                                                 | 897                             | 283                                                  |
| NEWBURY             | 612                                                                    | 2,672                   | 0.49                                                 | 6,700                           | 3,284                                                |
| NEWBURYPORT         | 1,631                                                                  | 5,900                   | 0.45                                                 | 16,775                          | 7,531                                                |
| NEWTON              | 12,550                                                                 | 29,021                  | 0.51                                                 | 81,179                          | 41,571                                               |
| NORFOLK             | 723                                                                    | 986                     | 0.18                                                 | 9,270                           | 1,709                                                |
| NORTH ADAMS         | 3,069                                                                  | 7,107                   | 0.70                                                 | 14,473                          | 10,176                                               |
| NORTH ANDOVER       | 1,940                                                                  | 7,331                   | 0.38                                                 | 24,279                          | 9,271                                                |
| NORTH ATTLEBOROUGH  | 2,118                                                                  | 8,550                   | 0.39                                                 | 27,139                          | 10,668                                               |
| NORTH BROOKFIELD    | 433                                                                    | 690                     | 0.23                                                 | 4,948                           | 1,123                                                |
| NORTH READING       | 961                                                                    | 3,571                   | 0.37                                                 | 12,300                          | 4,532                                                |
| NORTHAMPTON         | 3,287                                                                  | 0                       | 0.40                                                 | 28,879                          | 11,552                                               |
| NORTHBOROUGH        | 1,094                                                                  | 4,883                   | 0.47                                                 | 12,799                          | 5,977                                                |
| NORTHBRIDGE         | 296                                                                    | 5,297                   | 0.40                                                 | 13,988                          | 5,593                                                |
| NORTHFIELD          | 506                                                                    | 800                     | 0.45                                                 | 2,919                           | 1,306                                                |
| NORTON              | 0                                                                      | 0                       | 0.40                                                 | 15,283                          | 6,113                                                |
| NORWELL             | 1,337                                                                  | 3,723                   | 0.51                                                 | 10,009                          | 5,060                                                |
| NORWOOD             | 2,003                                                                  | 8,918                   | 0.39                                                 | 28,326                          | 10,921                                               |
| OAK BLUFFS          | 875                                                                    | 3,304                   | 1.09                                                 | 3,830                           | 4,179                                                |
| OAKHAM              | 0                                                                      | 0                       | 0.40                                                 | 1,689                           | 676                                                  |
| ORANGE              | 1,151                                                                  | 1,315                   | 0.34                                                 | 7,312                           | 2,466                                                |
| ORLEANS             | 730                                                                    | 4,159                   | 0.84                                                 | 5,832                           | 4,889                                                |
| OTIS                | 195                                                                    | 454                     | 0.58                                                 | 1,122                           | 649                                                  |
| OXFORD              | 0                                                                      | 7,632                   | 0.40                                                 | 13,218                          | 5,287                                                |
| PALMER              | 256                                                                    | 0                       | 0.40                                                 | 12,265                          | 4,906                                                |
| PAXTON              | 370                                                                    | 1,201                   | 0.39                                                 | 4,029                           | 1,571                                                |
| PEABODY             | 3,567                                                                  | 19,451                  | 0.46                                                 | 49,560                          | 23,018                                               |

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|---------------------|------------------------------------------------------------------------|-------------------------|------------------------------------------------------|---------------------------------|------------------------------------------------------|
| PELHAM              | 84                                                                     | 0                       | 0.40                                                 | 1,460                           | 584                                                  |
| PEMBROKE            | 706                                                                    | 6,476                   | 0.46                                                 | 15,726                          | 7,182                                                |
| PEPPERELL           | 718                                                                    | 897                     | 0.15                                                 | 11,115                          | 1,616                                                |
| PERU                | 56                                                                     | 183                     | 0.28                                                 | 868                             | 239                                                  |
| PETERSHAM           | 54                                                                     | 243                     | 0.25                                                 | 1,177                           | 297                                                  |
| PHILLIPSTON         | 0                                                                      | 0                       | 0.40                                                 | 1,667                           | 667                                                  |
| PITTSFIELD          | 2,971                                                                  | 15,828                  | 0.39                                                 | 47,927                          | 18,799                                               |
| PLAINFIELD          | 59                                                                     | 94                      | 0.25                                                 | 609                             | 153                                                  |
| PLAINVILLE          | 554                                                                    | 1,574                   | 0.29                                                 | 7,229                           | 2,128                                                |
| PLYMOUTH            | 2,215                                                                  | 20,173                  | 0.46                                                 | 49,008                          | 22,388                                               |
| PLYMPTON            | 0                                                                      | 0                       | 0.40                                                 | 2,582                           | 1,033                                                |
| PRINCETON           | 0                                                                      | 0                       | 0.40                                                 | 3,531                           | 1,412                                                |
| PROVINCETOWN        | 870                                                                    | 2,523                   | 0.95                                                 | 3,577                           | 3,393                                                |
| QUINCY              | 3,852                                                                  | 30,754                  | 0.40                                                 | 85,988                          | 34,606                                               |
| RANDOLPH            | 1,972                                                                  | 10,820                  | 0.41                                                 | 31,365                          | 12,792                                               |
| RAYNHAM             | 870                                                                    | 6,500                   | 0.72                                                 | 10,181                          | 7,370                                                |
| READING             | 1,755                                                                  | 8,239                   | 0.44                                                 | 22,659                          | 9,994                                                |
| REHOBOTH            | 517                                                                    | 0                       | 0.40                                                 | 9,653                           | 3,861                                                |
| REVERE              | 3,505                                                                  | 27,034                  | 0.70                                                 | 43,766                          | 30,539                                               |
| RICHMOND            | 20                                                                     | 673                     | 0.41                                                 | 1,710                           | 693                                                  |
| ROCHESTER           | 211                                                                    | 2,085                   | 0.51                                                 | 4,500                           | 2,296                                                |
| ROCKLAND            | 810                                                                    | 6,350                   | 0.43                                                 | 16,559                          | 7,160                                                |
| ROCKPORT            | 1,278                                                                  | 2,997                   | 0.55                                                 | 7,773                           | 4,275                                                |
| ROWE                | 62                                                                     | 117                     | 0.48                                                 | 373                             | 179                                                  |
| ROWLEY              | 175                                                                    | 0                       | 0.40                                                 | 5,100                           | 2,040                                                |
| ROYALSTON           | 176                                                                    | 340                     | 0.43                                                 | 1,213                           | 516                                                  |
| RUSSELL             | 105                                                                    | 296                     | 0.24                                                 | 1,704                           | 401                                                  |
| RUTLAND             | 0                                                                      | 0                       | 0.40                                                 | 5,303                           | 2,121                                                |
| SALEM               | 3,196                                                                  | 13,243                  | 0.44                                                 | 37,735                          | 16,439                                               |
| SALISBURY           | 719                                                                    | 3,600                   | 0.58                                                 | 7,389                           | 4,319                                                |
| SANDISFIELD         | 60                                                                     | 301                     | 0.54                                                 | 668                             | 361                                                  |
| SANDWICH            | 1,449                                                                  | 7,779                   | 0.45                                                 | 20,500                          | 9,228                                                |
| SAUGUS              | 1,773                                                                  | 10,392                  | 0.48                                                 | 25,553                          | 12,165                                               |
| SAVOY               | 34                                                                     | 127                     | 0.22                                                 | 738                             | 161                                                  |
| SCITUATE            | 1,926                                                                  | 7,365                   | 0.52                                                 | 18,000                          | 9,292                                                |
| SEEKONK             | 1,439                                                                  | 3,038                   | 0.35                                                 | 12,735                          | 4,477                                                |
| SHARON              | 1,711                                                                  | 6,005                   | 0.45                                                 | 17,298                          | 7,716                                                |
| SHEFFIELD           | 399                                                                    | 1,000                   | 0.41                                                 | 3,400                           | 1,399                                                |
| SHELBURNE           | 156                                                                    | 364                     | 0.26                                                 | 2,012                           | 520                                                  |
| SHERBORN            | 534                                                                    | 2,240                   | 0.63                                                 | 4,417                           | 2,774                                                |
| SHIRLEY             | 247                                                                    | 0                       | 0.40                                                 | 6,140                           | 2,456                                                |
| SHREWSBURY          | 2,025                                                                  | 9,336                   | 0.42                                                 | 27,173                          | 11,361                                               |
| SHUTESBURY          | 176                                                                    | 418                     | 0.36                                                 | 1,650                           | 594                                                  |
| SOMERSET            | 1,962                                                                  | 4,195                   | 0.36                                                 | 17,078                          | 6,157                                                |
| SOMERVILLE          | 4,887                                                                  | 33,421                  | 0.49                                                 | 78,385                          | 38,308                                               |
| SOUTH HADLEY        | 1,480                                                                  | 4,132                   | 0.33                                                 | 16,988                          | 5,612                                                |
| SOUTHAMPTON         | 734                                                                    | 819                     | 0.30                                                 | 5,145                           | 1,553                                                |

\* Generation for non-reporting municipalities is based on a default estimated generation rate. The default estimated generation rate is 0.40, which does not include composted waste.

| <b>Municipality</b> | <b>MSW Recycled: Glass,<br/>Metal, Paper, Plastic<br/>and Textiles</b> | <b>MSW<br/>Disposed</b> | <b>MSW Generation<br/>Rate*<br/>tons/person/year</b> | <b>Estimated<br/>Population</b> | <b>MSW<br/>Generation*<br/>(Recycled + Disposed)</b> |
|---------------------|------------------------------------------------------------------------|-------------------------|------------------------------------------------------|---------------------------------|------------------------------------------------------|
| SOUTHBOROUGH        | 533                                                                    | 3,517                   | 0.52                                                 | 7,768                           | 4,050                                                |
| SOUTHBRIDGE         | 642                                                                    | 1,800                   | 0.14                                                 | 17,000                          | 2,442                                                |
| SOUTHWICK           | 655                                                                    | 0                       | 0.40                                                 | 7,850                           | 3,140                                                |
| SPENCER             | 1,065                                                                  | 5,830                   | 0.56                                                 | 12,218                          | 6,895                                                |
| SPRINGFIELD         | 8,381                                                                  | 45,395                  | 0.36                                                 | 150,000                         | 53,776                                               |
| STERLING            | 682                                                                    | 2,386                   | 0.46                                                 | 6,733                           | 3,068                                                |
| STOCKBRIDGE         | 718                                                                    | 1,176                   | 0.79                                                 | 2,397                           | 1,894                                                |
| STONEHAM            | 1,877                                                                  | 9,345                   | 0.50                                                 | 22,238                          | 11,222                                               |
| STOUGHTON           | 1,188                                                                  | 8,126                   | 0.34                                                 | 27,147                          | 9,314                                                |
| STOW                | 0                                                                      | 0                       | 0.40                                                 | 5,626                           | 2,250                                                |
| STURBRIDGE          | 367                                                                    | 297                     | 0.08                                                 | 8,057                           | 664                                                  |
| SUDBURY             | 945                                                                    | 1,394                   | 0.14                                                 | 16,506                          | 2,339                                                |
| SUNDERLAND          | 216                                                                    | 533                     | 0.26                                                 | 2,870                           | 749                                                  |
| SUTTON              | 431                                                                    | 1,282                   | 0.21                                                 | 8,100                           | 1,713                                                |
| SWAMPSCOTT          | 1,348                                                                  | 5,659                   | 0.48                                                 | 14,500                          | 7,007                                                |
| SWANSEA             | 1,182                                                                  | 6,121                   | 0.48                                                 | 15,373                          | 7,303                                                |
| TAUNTON             | 4,086                                                                  | 13,721                  | 0.34                                                 | 51,624                          | 17,807                                               |
| TEMPLETON           | 0                                                                      | 0                       | 0.40                                                 | 6,600                           | 2,640                                                |
| TEWKSBURY           | 1,643                                                                  | 10,895                  | 0.43                                                 | 29,077                          | 12,538                                               |
| TISBURY             | 421                                                                    | 1,470                   | 0.61                                                 | 3,102                           | 1,891                                                |
| TOLLAND             | 43                                                                     | 192                     | 0.72                                                 | 326                             | 235                                                  |
| TOPSFIELD           | 630                                                                    | 2,393                   | 0.53                                                 | 5,728                           | 3,023                                                |
| TOWNSEND            | 450                                                                    | 3,120                   | 0.38                                                 | 9,300                           | 3,570                                                |
| TRURO               | 367                                                                    | 2,112                   | 1.36                                                 | 1,821                           | 2,479                                                |
| TYNGSBOROUGH        | 938                                                                    | 4,657                   | 0.59                                                 | 9,500                           | 5,595                                                |
| TYRINGHAM           | 128                                                                    | 261                     | 1.07                                                 | 363                             | 389                                                  |
| UPTON               | 307                                                                    | 1,530                   | 0.37                                                 | 5,024                           | 1,837                                                |
| UXBRIDGE            | 183                                                                    | 0                       | 0.40                                                 | 11,393                          | 4,557                                                |
| WAKEFIELD           | 2,345                                                                  | 10,588                  | 0.52                                                 | 24,741                          | 12,933                                               |
| WALES               | 0                                                                      | 0                       | 0.40                                                 | 1,676                           | 670                                                  |
| WALPOLE             | 2,078                                                                  | 6,781                   | 0.42                                                 | 21,086                          | 8,859                                                |
| WALTHAM             | 3,491                                                                  | 22,428                  | 0.44                                                 | 59,251                          | 25,919                                               |
| WARE                | 0                                                                      | 0                       | 0.40                                                 | 10,254                          | 4,102                                                |
| WAREHAM             | 217                                                                    | 9,800                   | 0.50                                                 | 20,037                          | 10,017                                               |
| WARREN              | 0                                                                      | 0                       | 0.40                                                 | 4,744                           | 1,898                                                |
| WARWICK             | 111                                                                    | 200                     | 0.48                                                 | 650                             | 311                                                  |
| WASHINGTON          | 59                                                                     | 149                     | 0.34                                                 | 615                             | 208                                                  |
| WATERTOWN           | 3,008                                                                  | 15,311                  | 0.55                                                 | 33,284                          | 18,319                                               |
| WAYLAND             | 2,692                                                                  | 2,519                   | 0.40                                                 | 13,091                          | 5,211                                                |
| WEBSTER             | 874                                                                    | 3,313                   | 0.27                                                 | 15,500                          | 4,187                                                |
| WELLESLEY           | 3,601                                                                  | 9,573                   | 0.50                                                 | 26,215                          | 13,174                                               |
| WELLFLEET           | 520                                                                    | 2,171                   | 0.84                                                 | 3,200                           | 2,692                                                |
| WENDELL             | 118                                                                    | 240                     | 0.36                                                 | 981                             | 358                                                  |
| WENHAM              | 338                                                                    | 1,447                   | 0.42                                                 | 4,253                           | 1,785                                                |
| WEST BOYLSTON       | 778                                                                    | 1,944                   | 0.40                                                 | 6,823                           | 2,722                                                |
| WEST BRIDGEWATER    | 376                                                                    | 2,200                   | 0.40                                                 | 6,481                           | 2,576                                                |
| WEST BROOKFIELD     | 0                                                                      | 0                       | 0.40                                                 | 3,707                           | 1,483                                                |

\* Generation for non-reporting municipalities is based on a default estimated generation rate. The default estimated generation rate is 0.40, which does not include composted waste.



| <b>Municipality</b> | <b>MSW Recycled: Glass,<br/>Metal, Paper, Plastic<br/>and Textiles</b> | <b>MSW<br/>Disposed</b> | <b>MSW Generation<br/>Rate*<br/>tons/person/year</b> | <b>Estimated<br/>Population</b> | <b>MSW<br/>Generation*<br/>(Recycled + Disposed)</b> |
|---------------------|------------------------------------------------------------------------|-------------------------|------------------------------------------------------|---------------------------------|------------------------------------------------------|
| WEST NEWBURY        | 467                                                                    | 1,964                   | 0.68                                                 | 3,599                           | 2,431                                                |
| WEST SPRINGFIELD    | 1,921                                                                  | 7,554                   | 0.34                                                 | 27,705                          | 9,475                                                |
| WEST STOCKBRIDGE    | 247                                                                    | 794                     | 0.69                                                 | 1,502                           | 1,041                                                |
| WEST TISBURY        | 552                                                                    | 1,624                   | 1.23                                                 | 1,774                           | 2,176                                                |
| WESTBOROUGH         | 1,115                                                                  | 5,213                   | 0.44                                                 | 14,260                          | 6,328                                                |
| WESTFIELD           | 3,207                                                                  | 9,448                   | 0.32                                                 | 39,310                          | 12,653                                               |
| WESTFORD            | 2,213                                                                  | 8,007                   | 0.54                                                 | 19,100                          | 10,220                                               |
| WESTHAMPTON         | 122                                                                    | 0                       | 0.40                                                 | 1,374                           | 550                                                  |
| WESTMINSTER         | 412                                                                    | 0                       | 0.40                                                 | 6,477                           | 2,591                                                |
| WESTON              | 1,474                                                                  | 2,672                   | 0.39                                                 | 10,660                          | 4,146                                                |
| WESTPORT            | 222                                                                    | 1,908                   | 0.15                                                 | 13,816                          | 2,130                                                |
| WESTWOOD            | 1,360                                                                  | 5,561                   | 0.53                                                 | 12,940                          | 6,921                                                |
| WEYMOUTH            | 3,188                                                                  | 20,000                  | 0.43                                                 | 54,207                          | 23,188                                               |
| WHATELY             | 113                                                                    | 134                     | 0.17                                                 | 1,430                           | 247                                                  |
| WHITMAN             | 0                                                                      | 0                       | 0.40                                                 | 13,416                          | 5,366                                                |
| WILBRAHAM           | 1,503                                                                  | 3,390                   | 0.39                                                 | 12,635                          | 4,893                                                |
| WILLIAMSBURG        | 292                                                                    | 886                     | 0.46                                                 | 2,559                           | 1,178                                                |
| WILLIAMSTOWN        | 437                                                                    | 560                     | 0.13                                                 | 7,888                           | 997                                                  |
| WILMINGTON          | 1,470                                                                  | 9,659                   | 0.53                                                 | 21,094                          | 11,129                                               |
| WINCHENDON          | 424                                                                    | 5,200                   | 0.58                                                 | 9,654                           | 5,624                                                |
| WINCHESTER          | 2,110                                                                  | 8,980                   | 0.55                                                 | 20,044                          | 11,090                                               |
| WINDSOR             | 147                                                                    | 215                     | 0.47                                                 | 770                             | 362                                                  |
| WINTHROP            | 1,187                                                                  | 7,228                   | 0.48                                                 | 17,628                          | 8,415                                                |
| WOBURN              | 2,176                                                                  | 14,964                  | 0.48                                                 | 35,917                          | 17,140                                               |
| WORCESTER           | 10,459                                                                 | 25,551                  | 0.21                                                 | 169,759                         | 36,010                                               |
| WORTHINGTON         | 139                                                                    | 271                     | 0.33                                                 | 1,248                           | 410                                                  |
| WRENTHAM            | 850                                                                    | 3,946                   | 0.48                                                 | 10,000                          | 4,796                                                |
| YARMOUTH            | 2,209                                                                  | 9,397                   | 0.54                                                 | 21,430                          | 11,606                                               |
| <b>TOTALS:</b>      | <b>351</b>                                                             | <b>426,278</b>          | <b>2,076,573</b>                                     | <b>6,194,789</b>                | <b>2,684,815</b>                                     |

\* Generation for non-reporting municipalities is based on a default estimated generation rate. The default estimated generation rate is 0.40, which does not include composted waste.

## APPENDIX C

### Municipal Recycling Tonnages

#### 1998 Municipal Recycling, Tons collected for Major Material Types

| Municipality | Plastics | Scrap Metal | Glass | Commingled Containers | Aseptic | White Goods | Newspaper | Mixed Paper | Aluminum | Steel/Tin Cans | Cardboard | Textiles |
|--------------|----------|-------------|-------|-----------------------|---------|-------------|-----------|-------------|----------|----------------|-----------|----------|
| ABINGTON     |          |             |       | 206                   |         | 62          |           | 768         |          |                |           |          |
| ACTON        |          | 500         |       | 300                   |         | 400         |           | 1,000       |          |                |           | 200      |
| ACUSHNET     |          |             |       | 142                   |         |             | 171       |             |          |                |           |          |
| AGAWAM       |          | 135         |       | 578                   |         | 119         |           | 1,417       |          |                |           |          |
| ALFORD       |          |             |       | 20                    |         |             |           | 43          |          |                |           |          |
| AMESBURY     | 18       |             | 120   |                       |         | 18          | 512       |             | 9        | 39             |           |          |
| AMHERST      |          | 189         |       | 696                   |         |             |           | 1,550       |          |                |           | 57       |
| ANDOVER      | 39       | 227         | 431   |                       |         |             |           | 2,213       | 5        | 7              |           |          |
| ARLINGTON    |          | 421         |       | 885                   |         | 130         |           | 4,040       |          |                |           |          |
| ASHBURNHAM   |          | 7           |       | 112                   |         |             |           | 207         | 1        |                | 24        |          |
| ASHFIELD     | 7        |             |       | 60                    |         | 20          |           | 149         |          |                |           | 13       |
| ASHLAND      | 45       |             |       | 286                   |         | 2           |           | 991         |          | 64             |           |          |
| ATTLEBORO    |          | 165         |       | 705                   |         | 138         |           | 1,896       |          |                |           | 2        |
| AUBURN       |          |             |       | 154                   |         |             |           | 517         |          |                |           |          |
| AVON         |          |             |       | 60                    |         | 2           | 250       |             |          |                |           | 1        |
| AYER         | 10       | 135         | 20    |                       |         |             | 100       | 65          | 0        | 10             | 46        | 12       |
| BARNSTABLE   | 54       | 694         | 284   |                       |         | 36          | 790       | 185         | 16       | 60             | 112       | 20       |
| BARRE        |          | 158         |       | 36                    |         |             |           | 79          |          |                |           | 20       |
| BECKET       | 7        | 40          |       | 38                    |         |             |           | 88          |          |                |           |          |
| BEDFORD      |          | 122         |       | 313                   |         | 83          |           | 1,156       |          |                |           |          |
| BELCHERTOWN  |          |             |       | 114                   |         |             |           | 440         |          |                |           |          |
| BELLINGHAM   | 15       |             | 145   |                       |         | 80          | 600       | 275         | 10       | 29             | 25        |          |
| BELMONT      |          | 302         |       | 598                   |         | 21          | 2,121     |             |          |                |           |          |
| BERKLEY      | 20       | 125         | 34    |                       |         |             | 93        | 61          |          |                | 67        | 18       |
| BERLIN       |          | 40          | 24    | 19                    |         |             | 86        | 3           |          |                | 33        |          |
| BERNARDSTON  | 7        | 12          |       | 50                    |         | 3           |           | 121         |          |                |           | 3        |
| BEVERLY      |          | 110         |       | 568                   |         | 212         |           | 2,130       | 156      |                |           |          |
| BILLERICA    |          |             |       | 496                   |         | 97          |           | 1,647       |          |                |           |          |
| BLACKSTONE   | 7        | 97          | 15    |                       |         |             |           | 76          |          | 10             |           | 6        |
| BLANDFORD    | 12       | 58          |       | 36                    |         |             |           | 62          |          |                |           |          |
| BOLTON       | 28       | 85          | 72    |                       |         | 2           | 160       | 135         | 2        | 24             | 85        | 2        |
| BOSTON       | 20       | 2,208       |       | 3,537                 |         | 5,273       |           | 12,845      |          |                |           | 231      |
| BOURNE       | 64       | 697         | 213   |                       |         |             | 584       | 131         | 9        | 58             | 113       | 45       |
| BOXBOROUGH   |          |             | 25    |                       |         |             | 200       | 100         |          | 25             |           |          |
| BOXFORD      | 1        | 71          |       | 341                   |         |             |           | 702         |          |                | 58        | 2        |
| BRAINTREE    |          |             | 8     | 403                   |         | 750         | 1,690     | 113         | 1        | 2              |           | 5        |
| BREWSTER     | 20       | 192         | 150   |                       |         |             | 403       | 141         |          | 29             | 40        | 27       |
| BRIDGEWATER  | 10       | 113         | 44    |                       |         |             | 119       |             |          | 73             | 5         | 11       |
| BRIMFIELD    |          |             |       | 43                    |         |             |           | 108         |          |                |           |          |
| BROCKTON     |          |             |       | 214                   |         | 1,560       |           | 2,109       |          |                |           |          |
| BROOKFIELD   | 15       | 100         | 60    |                       |         | 5           | 80        | 45          | 4        | 8              | 40        | 5        |
| BROOKLINE    |          |             |       | 855                   |         | 156         |           | 3,629       |          |                |           |          |
| BUCKLAND     | 7        | 50          |       | 38                    |         | 1           |           | 84          |          |                |           |          |
| BURLINGTON   |          |             |       | 498                   |         | 2           | 1,412     |             |          |                |           |          |



| Municipality    | Plastics | Scrap Metal | Glass | Commingle<br>Containers | Aseptic | White Goods | Newspaper | Mixed Paper | Aluminum | Steel/Tin Cans | Cardboard | Textiles |
|-----------------|----------|-------------|-------|-------------------------|---------|-------------|-----------|-------------|----------|----------------|-----------|----------|
| CAMBRIDGE       |          | 2           |       | 1,651                   |         | 98          |           | 6,087       |          |                |           | 7        |
| CANTON          |          |             |       | 251                     |         |             | 1,063     |             |          |                |           | 40       |
| CARLISLE        | 22       | 107         | 79    |                         |         |             | 274       | 161         | 1        | 12             | 111       |          |
| CHARLEMONT      |          |             | 7     | 26                      |         |             | 25        | 10          |          |                | 37        |          |
| CHARLTON        |          |             |       | 44                      |         |             | 100       |             |          |                |           |          |
| CHATHAM         | 10       | 153         | 204   | 53                      |         | 10          | 389       | 153         |          | 22             | 172       | 31       |
| CHELMSFORD      |          | 54          |       | 809                     |         |             |           | 2,534       |          |                |           | 10       |
| CHELSEA         |          |             |       | 174                     |         | 10          | 389       |             |          |                |           |          |
| CHESHIRE        |          | 30          |       | 80                      |         |             |           | 110         |          |                |           |          |
| CHESTERFIELD    | 3        |             |       | 17                      |         | 5           |           | 54          |          |                |           | 5        |
| CHICOPEE        |          |             |       | 844                     |         |             | 2,480     |             |          |                |           |          |
| CHILMARK        | 3        | 30          | 35    |                         |         | 11          | 13        | 14          | 1        | 3              | 28        | 4        |
| CLARKSBURG      |          | 3           |       | 202                     |         | 1           | 7         | 315         |          |                |           |          |
| COHASSET        | 23       | 136         | 96    |                         |         | 22          | 613       |             |          | 22             | 146       | 60       |
| COLRAIN         | 5        | 68          |       | 68                      |         |             |           | 68          |          |                |           |          |
| CONCORD         |          | 389         |       | 267                     |         |             |           | 998         |          |                |           | 150      |
| CONWAY          | 12       | 57          |       | 44                      |         | 7           |           | 124         |          |                |           | 4        |
| CUMMINGTON      | 2        |             |       | 21                      |         | 10          |           | 59          |          |                |           | 4        |
| DALTON          |          |             |       | 110                     |         |             |           | 389         |          |                |           |          |
| DANVERS         | 68       |             | 134   |                         |         | 247         | 1,237     |             |          | 10             |           |          |
| DARTMOUTH       | 26       | 234         | 153   |                         |         |             | 763       | 35          |          | 68             |           | 3        |
| DEDHAM          |          |             |       | 387                     |         |             |           | 1,279       |          |                |           |          |
| DEERFIELD       | 7        | 42          |       | 90                      |         |             |           | 291         |          |                |           |          |
| DENNIS          | 23       | 430         | 156   | 153                     |         |             | 505       |             |          | 22             | 238       | 13       |
| DIGHTON         |          | 10          |       | 110                     |         | 108         | 216       |             |          |                | 61        |          |
| DOUGLAS         |          | 136         | 22    | 7                       |         |             |           |             | 10       |                |           | 13       |
| DOVER           | 7        | 70          | 68    |                         |         |             | 389       | 10          |          | 22             | 28        | 10       |
| DRACUT          |          | 387         |       | 420                     |         | 60          |           | 1,262       |          |                |           |          |
| DUDLEY          | 7        | 60          | 38    |                         |         |             |           | 136         |          | 10             | 25        |          |
| DUNSTABLE       |          |             |       | 42                      |         |             |           | 172         |          | 35             | 4         | 2        |
| DUXBURY         | 38       | 35          | 136   |                         |         | 60          | 943       |             |          | 3              | 250       | 70       |
| EAST BROOKFIELD |          | 10          |       | 42                      |         | 20          |           | 13          |          |                |           |          |
| EAST LONGMEADOW |          | 131         |       | 329                     |         |             |           | 1,075       |          |                |           | 4        |
| EASTHAM         | 7        | 153         | 13    |                         |         |             | 204       |             | 10       | 10             |           | 38       |
| EASTHAMPTON     |          |             |       | 181                     |         |             |           | 583         |          |                |           |          |
| EASTON          |          | 245         |       | 150                     |         | 60          | 20        |             |          |                | 170       | 2        |
| EDGARTOWN       | 35       | 177         | 156   |                         |         | 57          | 236       | 60          | 3        | 10             | 127       | 10       |
| EGREMONT        | 7        | 70          |       | 68                      |         |             |           | 153         |          |                |           |          |
| ERVING          |          | 7           |       | 42                      |         | 22          |           | 124         |          |                |           |          |
| ESSEX           | 7        | 13          | 38    |                         |         | 10          |           | 210         |          | 13             |           | 36       |
| EVERETT         |          |             |       | 220                     |         | 60          |           | 505         |          |                |           | 3        |
| FAIRHAVEN       |          |             |       | 266                     |         | 10          | 497       |             |          |                |           | 60       |
| FALL RIVER      |          |             |       | 289                     |         | 261         | 606       |             |          |                |           |          |
| FALMOUTH        |          | 994         |       | 671                     |         |             |           | 1,666       |          |                | 116       | 19       |
| FITCHBURG       | 7        |             | 17    | 372                     |         | 418         | 50        | 748         |          |                | 24        |          |
| FLORIDA         |          |             |       | 13                      |         |             | 21        |             |          |                |           |          |
| FRAMINGHAM      | 3        |             | 16    |                         |         | 222         |           | 3,763       |          | 2              | 28        | 2        |
| FRANKLIN        |          | 142         | 6     | 608                     |         | 100         | 55        | 1,878       |          |                | 33        | 1        |
| FREETOWN        | 5        | 37          | 10    |                         | 2       |             | 45        | 12          | 1        | 5              | 17        | 10       |



| Municipality     | Plastics | Scrap Metal | Glass | Commingled Containers | Aseptic | White Goods | Newspaper | Mixed Paper | Aluminum | Steel/Tin Cans | Cardboard | Textiles |
|------------------|----------|-------------|-------|-----------------------|---------|-------------|-----------|-------------|----------|----------------|-----------|----------|
| GARDNER          |          | 212         |       | 231                   |         |             | 351       |             |          |                | 19        |          |
| GAY HEAD         | 3        | 13          | 12    |                       |         | 4           | 18        | 5           | 0        | 1              | 9         | 1        |
| GILL             |          |             |       | 28                    |         |             |           | 67          |          |                |           |          |
| GLOUCESTER       | 102      |             | 303   |                       |         | 139         |           | 1,502       |          | 102            |           | 116      |
| GOSHEN           | 6        |             |       | 15                    |         | 7           |           | 30          |          |                |           |          |
| GRANBY           |          | 229         |       | 92                    |         |             |           | 317         |          |                |           | 130      |
| GRANVILLE        |          | 18          |       | 28                    |         |             |           | 78          |          |                |           |          |
| GREAT BARRINGTON |          | 65          |       | 201                   |         |             |           | 678         |          |                |           |          |
| GREENFIELD       |          | 376         |       | 342                   |         | 18          |           | 1,222       |          |                | 161       |          |
| GROTON           | 102      |             | 139   |                       |         | 86          |           | 495         | 4        | 45             | 107       | 20       |
| HADLEY           |          | 84          |       | 83                    |         |             | 364       |             |          |                | 161       | 3        |
| HALIFAX          | 17       | 56          | 64    |                       |         | 6           | 205       | 2           |          | 28             | 13        | 1        |
| HAMILTON         | 24       | 12          | 84    |                       |         |             | 512       |             |          | 28             |           |          |
| HAMPDEN          | 18       | 28          | 30    |                       |         | 18          | 86        | 14          | 14       | 20             | 36        |          |
| HANCOCK          |          |             |       | 19                    |         |             |           | 14          |          |                |           |          |
| HANOVER          | 14       | 357         | 78    |                       |         |             | 699       |             | 12       | 14             | 169       | 20       |
| HARDWICK         | 14       | 14          | 28    |                       |         | 7           |           | 116         |          | 15             | 26        | 6        |
| HARVARD          | 18       | 139         | 86    |                       |         |             | 229       | 157         | 2        | 12             | 48        |          |
| HARWICH          | 14       | 525         | 171   |                       |         | 86          | 482       | 86          |          | 30             | 145       | 65       |
| HATFIELD         | 4        |             |       | 30                    |         | 28          |           | 146         |          |                |           | 18       |
| HAVERHILL        | 12       | 102         | 72    |                       |         | 157         |           | 2,454       | 6        | 18             |           | 6        |
| HEATH            |          |             |       | 83                    |         |             |           | 14          |          |                |           |          |
| HINGHAM          | 24       | 500         | 350   |                       |         |             | 1,252     |             |          | 42             | 169       | 116      |
| HINSDALE         |          | 24          |       | 37                    |         |             |           | 86          |          |                |           |          |
| HOLBROOK         |          |             |       | 157                   |         | 65          | 565       |             |          |                |           |          |
| HOLDEN           |          |             |       | 325                   |         |             | 779       |             |          |                |           |          |
| HOLLAND          |          |             |       |                       |         |             |           |             |          |                |           |          |
| HOLLISTON        |          | 55          |       | 318                   |         |             |           | 1,167       |          |                |           |          |
| HOLYOKE          |          | 199         |       | 327                   |         |             |           | 1,082       |          |                |           |          |
| HOPEDALE         |          | 110         |       | 100                   |         |             |           | 267         |          |                |           | 5        |
| HOPKINTON        |          |             | 113   | 46                    |         | 38          |           | 698         |          | 18             |           |          |
| HUBBARDSTON      |          | 35          | 20    | 13                    |         |             |           | 70          |          |                |           |          |
| HULL             |          |             |       | 10                    |         | 17          | 75        |             |          |                | 10        |          |
| HUNTINGTON       | 5        |             |       | 34                    |         | 20          |           | 120         |          |                |           |          |
| IPSWICH          | 42       | 180         | 153   |                       |         | 1           |           | 818         |          | 41             | 34        | 27       |
| KINGSTON         |          | 280         |       | 85                    |         | 64          | 352       |             | 6        |                | 49        | 35       |
| LAKEVILLE        | 51       | 113         | 76    |                       |         |             | 252       | 52          | 4        | 33             | 115       | 60       |
| LANCASTER        | 36       | 498         | 46    |                       |         | 200         | 10        | 193         | 40       | 91             | 142       | 25       |
| LANESBOROUGH     |          |             |       | 27                    |         |             | 36        | 38          |          |                | 35        |          |
| LAWRENCE         |          |             |       | 175                   |         | 339         |           | 744         |          |                |           |          |
| LEE              |          |             |       | 198                   |         |             |           | 659         |          |                |           |          |
| LEICESTER        | 54       | 291         | 42    | 23                    |         |             |           | 168         | 63       | 48             | 91        | 48       |
| LENOX            |          |             |       | 135                   |         |             |           | 495         |          |                |           |          |
| LEOMINSTER       |          |             |       | 796                   |         | 721         | 85        | 1,549       |          |                | 2         | 60       |
| LEVERETT         |          | 10          |       | 48                    |         |             |           | 136         |          |                |           | 3        |
| LEXINGTON        |          |             |       | 800                   |         | 67          |           | 3,370       |          |                |           |          |
| LEYDEN           | 1        |             |       |                       |         |             |           |             |          |                |           |          |
| LINCOLN          | 35       | 86          | 102   |                       |         |             |           | 522         |          | 20             |           |          |
| LITTLETON        | 25       | 205         |       |                       |         | 10          |           | 501         | 2        |                |           | 12       |



| Municipality     | Plastics | Scrap Metal | Glass | Commingled Containers | Aseptic | White Goods | Newspaper | Mixed Paper | Aluminum | Steel/Tin Cans | Cardboard | Textiles |
|------------------|----------|-------------|-------|-----------------------|---------|-------------|-----------|-------------|----------|----------------|-----------|----------|
| LONGMEADOW       |          | 62          |       | 319                   |         |             |           | 1,456       | 1        |                |           | 3        |
| LOWELL           | 285      |             | 410   |                       |         | 425         | 3,425     | 2,685       | 275      | 575            | 550       | 775      |
| LUDLOW           |          | 112         |       | 403                   |         |             |           | 889         |          |                |           |          |
| LYNN             |          |             |       | 15                    |         |             |           | 1,611       |          |                |           |          |
| LYNNFIELD        |          | 80          |       | 206                   |         | 5           |           | 875         |          |                |           |          |
| MALDEN           |          |             |       | 373                   |         | 350         | 1,444     |             |          |                |           |          |
| MANCHESTER       | 24       | 82          | 108   |                       |         | 5           |           | 503         |          | 24             |           | 5        |
| MANSFIELD        | 0        | 43          | 27    | 239                   |         | 24          | 167       | 794         |          | 19             | 4         | 19       |
| MARION           |          | 212         |       | 80                    |         |             | 142       |             |          | 0              |           |          |
| MARLBOROUGH      |          | 47          |       | 15                    |         | 333         | 406       | 2           |          |                | 32        | 0        |
| MARSHFIELD       |          | 292         |       | 641                   |         | 80          |           | 1,529       |          |                |           |          |
| MASHPEE          | 7        | 180         | 82    |                       |         |             | 244       | 19          |          | 14             |           |          |
| MATTAPOISETT     |          |             |       | 167                   |         | 82          | 224       |             |          |                |           |          |
| MAYNARD          |          | 80          |       | 257                   |         |             |           | 898         |          |                |           | 5        |
| MEDFIELD         | 34       |             | 163   |                       |         | 126         |           | 763         |          | 19             | 118       |          |
| MEDFORD          |          | 24          |       | 591                   |         | 167         | 2,534     |             |          |                |           |          |
| MEDWAY           |          | 34          |       | 258                   |         | 80          |           | 1,024       |          |                |           |          |
| MELROSE          |          |             |       | 373                   |         | 161         | 1,364     | 24          |          |                | 6         | 22       |
| MENDON           |          |             |       | 157                   |         |             |           | 244         |          |                |           |          |
| MERRIMAC         | 12       | 15          | 54    | 80                    |         | 5           | 80        | 206         | 2        |                |           | 0        |
| METHUEN          |          | 110         |       | 289                   |         | 54          |           | 1,789       |          |                |           | 0        |
| MIDDLEBOROUGH    | 80       |             | 180   |                       |         | 467         | 424       |             | 0        | 54             | 13        | 2        |
| MIDDLEFIELD      | 2        |             |       | 0                     |         | 5           |           | 24          |          |                |           | 0        |
| MIDDLETON        |          | 180         |       | 31                    |         |             |           | 258         |          |                |           | 21       |
| MILFORD          |          | 195         |       | 453                   |         | 80          |           | 1,277       |          |                |           | 0        |
| MILLBURY         | 0        | 333         | 54    | 142                   |         | 80          | 244       | 123         | 0        | 24             | 87        | 168      |
| MILLIS           |          |             |       | 67                    |         |             |           | 231         |          |                |           |          |
| MILLVILLE        |          | 51          |       | 142                   |         |             | 48        |             | 3        |                | 5         |          |
| MILTON           |          | 53          |       | 606                   |         | 190         | 0         | 2,533       |          |                |           | 48       |
| MONROE           |          |             | 1     | 3                     |         |             | 5         |             |          |                |           |          |
| MONSON           |          |             |       | 139                   |         |             | 428       |             |          |                |           |          |
| MONTAGUE         |          | 80          |       | 174                   |         |             |           | 579         |          |                |           |          |
| MONTEREY         |          | 32          |       | 80                    |         |             |           | 80          |          |                |           |          |
| MOUNT WASHINGTO  | 1        | 0           |       | 0                     |         |             |           | 27          |          |                |           | 2        |
| NAHANT           |          |             |       | 69                    |         |             |           | 206         |          |                |           |          |
| NANTUCKET        | 80       | 523         | 27    |                       |         |             | 137       | 486         |          | 121            | 381       | 15       |
| NATICK           |          |             |       | 596                   |         |             |           | 2,457       |          |                |           |          |
| NEEDHAM          |          | 591         |       | 502                   |         |             |           | 2,396       |          |                | 210       | 167      |
| NEW BEDFORD      | 80       | 385         | 239   |                       |         | 180         | 1,172     | 36          |          | 121            | 226       | 19       |
| NEW BRAINTREE    | 12       |             | 27    |                       |         |             |           | 168         |          | 15             |           |          |
| NEW SALEM        | 0        |             |       | 15                    |         |             |           | 64          |          |                |           |          |
| NEWBURY          | 24       | 80          | 80    |                       |         | 0           | 0         | 232         |          | 24             | 132       | 1        |
| NEWBURYPORT      | 80       |             | 224   |                       |         | 34          | 979       |             | 17       | 76             | 249       | 15       |
| NEWTON           |          | 34          |       | 2,319                 |         | 0           |           | 9,787       |          |                |           | 357      |
| NORFOLK          | 19       |             | 64    |                       |         | 80          | 383       | 0           |          | 168            | 91        | 2        |
| NORTH ADAMS      |          | 12          |       | 1,192                 |         | 0           |           | 1,857       |          |                |           |          |
| NORTH ANDOVER    | 28       | 145         | 211   |                       |         | 81          |           | 1,390       | 6        | 46             | 32        |          |
| NORTH ATTLEBOROU |          | 10          |       | 405                   |         | 505         |           | 1,198       |          |                |           |          |
| NORTH BROOKFIELD | 18       | 69          | 48    |                       |         |             | 72        | 135         | 4        | 20             | 54        | 13       |



| Municipality  | Plastics | Scrap Metal | Glass | Commingled Containers | Aseptic | White Goods | Newspaper | Mixed Paper | Aluminum | Steel/Tin Cans | Cardboard | Textiles |
|---------------|----------|-------------|-------|-----------------------|---------|-------------|-----------|-------------|----------|----------------|-----------|----------|
| NORTH READING | 28       |             | 72    |                       |         |             | 602       |             | 137      |                | 122       |          |
| NORTHAMPTON   |          | 900         |       | 744                   |         |             |           | 1,591       |          |                |           | 52       |
| NORTHBOROUGH  | 49       |             | 197   |                       |         |             |           | 788         |          | 59             |           | 1        |
| NORTHBRIDGE   |          |             |       | 34                    |         |             |           | 222         |          |                |           |          |
| NORTHFIELD    |          | 190         |       | 72                    |         |             |           | 250         |          |                | 24        |          |
| NORTON        |          |             |       |                       |         |             |           |             |          |                |           |          |
| NORWELL       |          | 397         |       | 190                   |         |             | 746       |             |          |                | 2         |          |
| NORWOOD       |          | 26          |       | 442                   |         |             |           | 1,535       |          |                |           |          |
| OAK BLUFFS    | 6        | 245         | 12    | 138                   |         | 14          | 190       | 142         |          |                | 121       | 6        |
| ORANGE        | 26       | 147         |       | 141                   |         |             |           | 452         |          |                | 329       | 26       |
| ORLEANS       | 17       | 145         | 138   |                       |         | 30          |           | 284         | 85       | 85             | 44        | 21       |
| OTIS          | 5        | 53          |       | 34                    |         |             |           | 34          |          |                |           |          |
| OXFORD        |          |             |       |                       |         |             |           |             |          |                |           |          |
| PALMER        |          |             |       |                       |         |             | 206       |             |          |                |           |          |
| PAXTON        |          |             |       | 34                    |         |             |           | 276         |          |                |           | 6        |
| PEABODY       |          | 501         |       | 618                   |         | 78          | 2,289     | 77          |          |                |           | 3        |
| PELHAM        |          |             |       | 18                    |         |             |           | 68          |          |                |           |          |
| PEMBROKE      | 22       | 126         | 34    |                       |         |             | 335       | 72          |          | 26             | 85        |          |
| PEPPERELL     | 18       | 150         | 34    | 150                   |         | 26          | 138       |             | 18       | 30             | 120       |          |
| PERU          |          |             |       | 18                    |         |             |           | 34          |          |                |           |          |
| PETERSHAM     |          |             |       | 17                    |         |             |           | 34          |          |                |           |          |
| PITTSFIELD    |          |             |       | 815                   |         |             |           | 2,156       |          |                |           |          |
| PLAINFIELD    | 2        |             |       | 18                    |         | 6           |           | 34          |          |                |           | 6        |
| PLAINVILLE    |          | 85          |       | 126                   |         |             |           | 343         |          |                |           |          |
| PLYMOUTH      |          | 720         |       | 135                   |         |             | 639       |             |          | 56             | 85        | 580      |
| PROVINCETOWN  | 21       | 164         | 227   |                       |         | 119         |           | 60          |          | 22             | 257       |          |
| QUINCY        | 170      |             | 43    | 319                   |         | 12          |           | 3,305       | 2        | 3              |           |          |
| RANDOLPH      |          |             |       | 491                   |         | 292         |           | 1,189       |          |                |           |          |
| RAYNHAM       | 18       | 285         | 31    |                       |         | 249         | 206       |             |          | 85             | 61        | 6        |
| READING       | 68       |             | 206   |                       |         | 85          |           | 1,392       | 68       |                |           | 6        |
| REHOBOTH      | 17       | 126         | 64    |                       |         |             | 162       |             |          |                | 77        | 21       |
| REVERE        |          | 800         |       | 580                   |         |             |           | 2,125       |          |                |           |          |
| RICHMOND      |          | 26          |       | 6                     |         |             |           | 6           |          |                |           |          |
| ROCHESTER     |          |             |       | 68                    |         |             | 141       |             |          | 3              | 2         | 2        |
| ROCKLAND      |          | 21          |       | 186                   |         |             | 603       |             |          |                |           |          |
| ROCKPORT      | 32       | 175         | 155   |                       |         |             |           | 674         |          | 79             | 52        | 65       |
| ROWE          | 1        | 25          |       | 11                    |         |             |           | 26          |          |                |           |          |
| ROWLEY        | 4        |             | 15    |                       |         |             | 145       |             |          | 10             |           |          |
| ROYALSTON     |          | 93          |       | 24                    |         |             |           |             |          |                | 53        | 3        |
| RUSSELL       | 3        | 6           |       | 23                    |         |             |           | 73          |          |                |           |          |
| SALEM         |          | 265         |       | 468                   |         | 390         |           | 2,073       |          |                |           |          |
| SALISBURY     | 21       | 81          | 90    | 14                    |         | 48          | 386       |             | 6        | 30             | 1         | 10       |
| SANDISFIELD   | 4        | 13          |       | 15                    |         |             |           | 28          |          |                |           |          |
| SANDWICH      | 40       |             | 145   |                       |         | 310         |           | 730         | 4        | 35             | 125       | 60       |
| SAUGUS        |          |             |       | 322                   |         | 97          |           | 1,332       |          |                |           | 22       |
| SAVOY         |          |             |       | 12                    |         |             |           | 20          |          |                |           |          |
| SCITUATE      |          | 318         |       | 269                   |         | 65          |           | 1,184       |          |                |           |          |
| SEEKONK       | 39       |             |       |                       |         | 76          |           | 1,195       | 53       |                |           | 76       |
| SHARON        |          | 70          |       | 283                   |         |             |           | 1,359       |          |                |           |          |



| Municipality | Plastics | Scrap Metal | Glass | Commingle<br>Containers | Aseptic | White Goods | Newspaper | Mixed Paper | Aluminum | Steel/Tin Cans | Cardboard | Textiles |
|--------------|----------|-------------|-------|-------------------------|---------|-------------|-----------|-------------|----------|----------------|-----------|----------|
| SHEFFIELD    | 14       | 96          |       | 83                      |         |             |           | 204         |          |                |           | 1        |
| SHELBURNE    | 5        | 3           |       | 38                      |         |             | 1         | 107         |          |                |           | 2        |
| SHERBORN     |          | 94          |       | 88                      |         | 15          |           | 298         |          |                |           | 39       |
| SHIRLEY      | 10       | 10          | 30    |                         |         | 10          | 73        | 10          | 8        | 17             | 12        |          |
| SHREWSBURY   |          |             |       | 519                     |         |             |           | 1,468       |          |                | 39        |          |
| SHUTESBURY   |          |             |       | 10                      |         |             |           | 126         |          |                |           |          |
| SOMERSET     |          |             |       | 1,962                   |         |             |           |             |          |                | 8         |          |
| SOMERVILLE   |          |             |       | 957                     |         | 420         |           | 3,510       |          |                |           |          |
| SOUTH HADLEY |          | 100         |       | 300                     |         | 25          |           | 300         |          |                |           | 105      |
| SOUTHAMPTON  |          | 272         |       | 105                     |         |             |           | 357         |          |                |           |          |
| SOUTHBOROUGH |          | 90          |       | 10                      |         |             | 282       |             |          |                |           | 19       |
| SOUTHBRIDGE  |          |             |       | 177                     |         |             |           | 465         |          |                |           |          |
| SOUTHWICK    |          | 255         |       | 105                     |         |             |           | 255         |          |                |           |          |
| SPENCER      | 50       | 300         | 90    |                         |         | 90          |           | 300         |          | 150            |           | 75       |
| SPRINGFIELD  |          | 1,672       |       | 1,610                   |         | 301         |           | 4,798       |          |                |           |          |
| STERLING     |          | 137         |       | 105                     |         | 25          |           | 336         | 8        |                | 77        |          |
| STOCKBRIDGE  | 12       |             |       | 137                     |         |             |           | 519         |          |                |           |          |
| STONEHAM     |          | 110         |       | 357                     |         | 90          |           | 1,250       |          |                |           | 70       |
| STOUGHTON    |          | 23          |       | 334                     |         | 92          | 728       |             |          |                |           | 5        |
| STURBRIDGE   | 23       |             | 92    |                         |         | 8           | 105       | 90          | 8        | 17             | 42        | 2        |
| SUDBURY      | 8        | 41          | 90    |                         |         |             | 379       | 220         |          | 8              | 96        | 119      |
| SUNDERLAND   |          |             |       | 90                      |         |             |           | 152         |          |                |           |          |
| SUTTON       | 10       | 90          | 33    |                         |         | 25          | 105       |             |          | 12             | 156       |          |
| SWAMPSCOTT   |          |             |       | 254                     |         | 75          |           | 1,024       |          |                |           |          |
| SWANSEA      |          |             |       | 372                     |         | 90          |           | 443         |          |                |           |          |
| TAUNTON      |          |             |       | 1,122                   |         | 242         |           | 2,723       |          |                |           |          |
| TEWKSBURY    | 30       | 92          | 192   |                         |         | 90          | 1,179     |             | 8        | 75             |           | 8        |
| TISBURY      |          | 90          |       | 105                     |         |             | 162       |             |          |                | 44        |          |
| TOLLAND      | 8        |             |       | 10                      |         |             |           | 137         |          |                |           |          |
| TOPSFIELD    | 90       | 19          | 10    |                         |         |             |           | 443         | 8        | 31             | 23        | 8        |
| TOWNSEND     | 10       |             | 10    |                         |         |             | 122       | 105         |          |                | 44        | 12       |
| TRURO        | 5        | 10          | 10    |                         |         |             | 59        |             |          | 19             | 44        | 110      |
| TYNGSBOROUGH |          |             |       | 249                     |         |             |           | 689         |          |                |           |          |
| TYRINGHAM    |          | 26          | 8     | 8                       |         |             | 96        |             |          |                |           |          |
| UPTON        |          | 119         | 69    |                         |         |             | 119       |             |          |                |           | 6        |
| UXBRIDGE     |          | 10          |       | 50                      |         | 8           | 119       |             |          |                |           | 6        |
| WAKEFIELD    |          |             |       | 519                     |         | 105         |           | 1,636       |          |                |           |          |
| WALPOLE      |          |             |       | 443                     |         |             |           | 1,636       |          |                |           |          |
| WALTHAM      |          |             |       | 733                     |         |             |           | 2,758       |          |                |           |          |
| WAREHAM      | 8        |             | 10    | 71                      |         |             | 158       | 90          |          | 8              | 11        | 6        |
| WARWICK      | 8        | 22          | 22    |                         |         |             |           | 19          | 19       | 19             |           |          |
| WASHINGTON   |          | 8           |       | 10                      |         |             |           | 30          |          |                |           | 2        |
| WATERTOWN    |          | 267         | 8     | 524                     |         | 82          | 2,077     | 19          |          | 3              | 25        | 19       |
| WAYLAND      | 25       | 211         | 137   | 57                      |         | 19          |           | 1,145       |          | 57             | 252       | 115      |
| WEBSTER      | 8        | 82          | 75    |                         | 8       | 21          | 310       | 90          | 8        | 82             | 12        |          |
| WELLESLEY    | 55       | 271         | 317   | 41                      |         | 30          |           | 2,224       | 10       | 62             | 366       | 81       |
| WELLFLEET    | 6        | 186         | 145   |                         |         | 10          | 110       | 5           |          | 4              | 46        |          |
| WENDELL      | 9        | 38          |       | 23                      |         |             |           | 38          | 4        |                |           | 4        |
| WENHAM       | 13       | 50          | 51    |                         |         |             | 213       |             |          | 11             |           |          |



| Municipality     | Plastics     | Scrap Metal   | Glass         | Commingled Containers | Aseptic   | White Goods   | Newspaper     | Mixed Paper    | Aluminum     | Steel/Tin Cans | Cardboard    | Textiles     |
|------------------|--------------|---------------|---------------|-----------------------|-----------|---------------|---------------|----------------|--------------|----------------|--------------|--------------|
| WEST BOYLSTON    |              | 179           |               | 128                   |           |               |               | 470            |              |                |              |              |
| WEST BRIDGEWATER |              |               |               | 73                    |           | 5             | 205           |                |              |                | 63           | 20           |
| WEST NEWBURY     | 16           | 79            | 88            |                       |           |               | 258           |                | 4            | 24             |              |              |
| WEST SPRINGFIELD |              | 299           |               | 339                   |           |               | 1,283         |                |              |                |              |              |
| WEST STOCKBRIDGE | 9            | 58            |               | 36                    |           |               |               | 150            |              |                |              |              |
| WEST TISBURY     | 19           | 36            | 36            |                       |           | 28            | 131           | 36             | 2            | 9              | 71           | 9            |
| WESTBOROUGH      | 31           | 190           | 112           |                       | 1         |               | 532           | 34             | 1            | 25             | 100          | 190          |
| WESTFIELD        |              | 261           |               | 664                   |           |               |               | 2,283          |              |                |              |              |
| WESTFORD         |              |               | 1             | 374                   |           | 365           |               | 1,432          |              |                |              | 36           |
| WESTHAMPTON      | 9            |               |               | 23                    |           | 15            |               | 71             |              |                |              | 10           |
| WESTMINSTER      | 9            | 139           | 9             | 72                    |           |               | 169           | 9              | 1            | 1              | 12           |              |
| WESTON           |              | 126           | 190           | 36                    |           | 34            | 856           | 36             | 1            |                | 103          | 34           |
| WESTPORT         | 23           | 126           | 34            |                       |           |               |               |                |              | 17             | 45           | 9            |
| WESTWOOD         |              | 75            |               | 248                   |           | 55            |               | 485            |              |                |              |              |
| WEYMOUTH         |              |               |               | 220                   |           | 100           |               | 2,868          |              |                |              |              |
| WHATELY          | 9            |               |               | 23                    |           |               |               | 34             |              |                |              |              |
| WILBRAHAM        | 31           | 187           |               | 216                   |           |               |               | 1,069          |              |                |              |              |
| WILLIAMSBURG     | 9            |               |               | 59                    |           | 41            |               | 183            |              |                |              |              |
| WILLIAMSTOWN     |              | 9             |               | 36                    |           |               |               | 333            |              |                |              |              |
| WILMINGTON       |              |               |               | 287                   |           | 96            |               | 1,108          |              |                |              |              |
| WINCHENDON       | 9            | 248           | 41            |                       |           |               | 58            | 50             |              | 9              | 40           |              |
| WINCHESTER       | 36           | 485           | 179           |                       |           |               | 1,026         | 202            |              | 34             | 12           | 50           |
| WINDSOR          |              |               |               | 23                    |           | 72            |               | 52             |              |                |              |              |
| WINTHROP         |              |               |               | 287                   |           |               | 900           |                |              |                |              |              |
| WOBURN           |              |               |               | 239                   |           | 240           | 1             | 1,696          |              |                |              |              |
| WORCESTER        |              | 405           |               | 2,714                 |           |               |               | 7,294          |              |                |              | 72           |
| WORTHINGTON      | 5            |               |               | 30                    |           | 18            |               | 87             |              |                |              |              |
| WRENTHAM         |              |               |               | 192                   |           | 30            |               | 598            |              |                | 30           |              |
| YARMOUTH         |              | 756           |               | 320                   |           |               | 830           |                |              |                | 203          | 100          |
| <b>TOTALS:</b>   | <b>3,215</b> | <b>35,292</b> | <b>10,674</b> | <b>63,850</b>         | <b>11</b> | <b>21,440</b> | <b>60,855</b> | <b>204,964</b> | <b>1,054</b> | <b>3,560</b>   | <b>9,517</b> | <b>5,959</b> |





## APPENDIX D

### Available Recycling Access by Material and Town

#### Recycling Collection Method and Materials Accepted

| Municipality | Collection Method* | Newspaper | Cardboard | Mixed Paper | Wax/Aseptic Cartons | Glass | #1 (PET) | #2 (HDPE) | Other Plastics | Aluminum cans/foil | Steel/Tin cans | Aerosol cans | White Goods | Scrap Metal | Motor Oil | Spent anti-freeze | Auto batteries | Auto tires | Leaves/Yard Waste | Christmas Trees | C & D debris | Surplus paint | Swap Shop | Te1tles | Other Materials |
|--------------|--------------------|-----------|-----------|-------------|---------------------|-------|----------|-----------|----------------|--------------------|----------------|--------------|-------------|-------------|-----------|-------------------|----------------|------------|-------------------|-----------------|--------------|---------------|-----------|---------|-----------------|
| Abington     | Curb               | X         | X         | X           | X                   | X     | X        | X         |                | X                  | X              |              | X           |             |           |                   |                |            | X                 |                 |              |               |           |         |                 |
| Acton        | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         | X       |                 |
| Accent       | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           | X           |           |                   |                |            | X                 | X               |              |               |           | X       |                 |
| Adams        | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           |             | X         | X                 | X              | X          | X                 | X               |              | X             |           |         | X               |
| Agawam       | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           |             | X         |                   | X              | X          | X                 | X               |              |               |           |         |                 |
| Alford       | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   |                |            | X                 |                 | X            |               |           |         |                 |
| Amesbury     | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           |             | X         |                   | X              | X          | X                 | X               |              | X             |           | X       |                 |
| Amherst      | Curb               |           | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X       | X               |
| Andover      | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              |             | X           | X         |                   |                |            | X                 |                 |              |               |           |         |                 |
| Arlington    | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           |             | X         | X                 | X              |            | X                 | X               |              | X             |           |         |                 |
| Ashburnham   | Sub                | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   |                |            |                   |                 | X            |               |           |         |                 |
| Ashby        | Curb               | X         |           |             |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   |                |            | X                 |                 |              |               |           |         |                 |
| Ashfield     | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   |                |            | X                 | X               | X            | X             | X         | X       | X               |
| Ashland      | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              |             |             | X         |                   |                |            | X                 | X               |              | X             |           |         |                 |
| Athol        | Sub                | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                |            |                   |                 |              |               |           |         | X               |
| Attleboro    | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           | X       | X               |
| Auburn       | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           |             |           |                   |                |            | X                 | X               | X            |               |           |         |                 |
| Avon         | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           |           |                   |                |            | X                 | X               |              |               |           | X       |                 |
| Ayer         | Drop               | X         | X         | X           | X                   | X     |          |           |                | X                  | X              | X            | X           | X           | X         |                   | X              | X          | X                 | X               |              | X             |           | X       | X               |
| Bamstable    | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X       | X               |
| Barre        | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 | X               |              |               |           |         | X               |
| Becket       | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                |            | X                 |                 |              |               |           |         |                 |
| Bedford      | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           |           | X                 |                |            | X                 |                 |              | X             |           |         |                 |
| Belchertown  | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           | X       | X               |
| Bellingham   | Curb               | X         | X         | X           | X                   | X     | X        |           | X              | X                  |                |              | X           |             |           |                   | X              | X          | X                 | X               |              |               | X         | X       |                 |
| Belmont      | Curb               | X         |           | X           |                     | X     | X        | X         |                | X                  | X              |              |             |             | X         | X                 | X              |            | X                 |                 |              | X             |           |         |                 |
| Berkley      | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X       | X               |
| Berlin       | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   | X              | X          |                   | X               |              |               | X         | X       | X               |
| Bernardston  | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              |            |                   |                 | X            | X             |           | X       | X               |
| Beverly      | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           |             |           |                   |                |            | X                 |                 |              |               |           | X       | X               |
| Billerica    | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  |                |              | X           |             | X         |                   | X              | X          | X                 |                 |              |               |           |         |                 |
| Blackstone   | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              |             | X           |           |                   |                |            | X                 | X               |              |               |           |         | X               |
| Blandford    | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 | X               | X            | X             |           |         |                 |
| Bolton       | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   |                |            | X                 |                 |              |               |           |         |                 |
| Boston       | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         |         |                 |
| Bourne       | Curb               | X         | X         | X           |                     | X     |          |           |                | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X       |                 |
| Boxborough   | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              |             | X           |           |                   |                |            | X                 |                 |              | X             |           |         |                 |
| Boxford      | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              | X          |                   | X               | X            |               |           | X       | X               |
| Boylston     | Sub                |           |           |             |                     |       |          |           |                |                    |                |              |             |             |           |                   |                |            |                   |                 |              |               |           |         |                 |
| Braintree    | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         | X       | X               |
| Brewster     | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 | X               |              | X             | X         | X       | X               |
| Bridgewater  | Drop               | X         |           | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 |                 |              |               | X         | X       |                 |
| Brimfield    | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                |            |                   |                 |              |               |           |         |                 |
| Brockton     | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           |           |                   |                |            | X                 | X               |              |               |           |         | X               |
| Brookfield   | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 |                 | X            | X             | X         | X       | X               |
| Brookline    | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           | X           |           |                   |                |            | X                 | X               |              |               |           |         |                 |
| Buckland     | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              |            | X                 | X               |              | X             |           | X       | X               |
| Burlington   | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           |             | X         | X                 | X              | X          | X                 |                 |              | X             |           |         |                 |
| Cambridge    | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           |             | X         |                   |                |            | X                 | X               |              |               |           | X       | X               |
| Canton       | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           |         | X               |



| Municipality     | Collection Method* | Collection Method* |           |             |                     |       |          |           |                |                    |                |              |             |             |           |                   |                |            |                   |                 |              |               |           |
|------------------|--------------------|--------------------|-----------|-------------|---------------------|-------|----------|-----------|----------------|--------------------|----------------|--------------|-------------|-------------|-----------|-------------------|----------------|------------|-------------------|-----------------|--------------|---------------|-----------|
|                  |                    | Newspaper          | Cardboard | Mixed Paper | Wax/Aseptic Cartons | Glass | #1 (PET) | #2 (HDPE) | Other Plastics | Aluminum cans/foil | Steel/Tin cans | Aerosol cans | White Goods | Scrap Metal | Motor Oil | Spent anti-freeze | Auto batteries | Auto tires | Leaves/Yard Waste | Christmas Trees | C & D debris | Surplus paint | Swap Shop |
| Carlisle         | Drop               | X                  | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              |            | X                 | X               |              | X             |           |
| Carver           | Drop               | X                  | X         |             |                     | X     | X        | X         |                | X                  | X              |              | X           | X           |           |                   |                | X          | X                 | X               |              |               |           |
| Charlemont       | Drop               | X                  | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              |             |             |           |                   |                |            |                   |                 |              |               |           |
| Charlton         | Sub                |                    |           |             |                     |       |          |           |                |                    |                |              |             |             |           |                   |                |            |                   |                 |              |               |           |
| Chatham          | Drop               | X                  | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         |
| Chelmsford       | Curb               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         |                   | X              |            | X                 | X               |              | X             |           |
| Chelsea          | Curb               | X                  | X         | X           |                     | X     |          |           |                | X                  | X              | X            | X           | X           |           |                   |                |            | X                 | X               |              |               | X         |
| Cheshire         | Drop               | X                  |           |             |                     | X     |          |           |                |                    |                |              | X           | X           |           |                   |                |            | X                 | X               |              |               |           |
| Chester          | Drop               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          |                   |                 |              |               | X         |
| Chesterfield     | Drop               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          |                   |                 | X            | X             | X         |
| Chicopee         | Curb               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           |             |           |                   |                | X          | X                 | X               |              |               |           |
| Chilmark         | Drop               | X                  | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         |
| Clarksburg       | Drop               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          | X                 |                 | X            |               |           |
| Clinton          | Drop               | X                  |           | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          | X                 | X               |              |               |           |
| Cohasset         | Drop               | X                  | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 |                 |              | X             | X         |
| Colrain          | Drop               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          |                   |                 |              | X             | X         |
| Concord          | Curb               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   |                |            | X                 | X               | X            |               | X         |
| Conway           | Drop               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          |                   |                 |              | X             | X         |
| Cummington       | Drop               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          |                   |                 | X            | X             |           |
| Dalton           | Drop               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  |                | X            | X           |             |           |                   |                |            | X                 | X               | X            |               |           |
| Danvers          | Curb               | X                  | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           |           |                   |                |            |                   |                 |              |               | X         |
| Dartmouth        | Curb               | X                  |           | X           |                     | X     |          | X         |                | X                  | X              | X            | X           | X           | X         |                   |                | X          | X                 | X               |              | X             | X         |
| Dedham           | Curb               | X                  | X         | X           |                     | X     |          |           | X              | X                  | X              |              | X           |             | X         | X                 | X              | X          | X                 | X               |              | X             |           |
| Deerfield        | Drop               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          |                   | X               |              |               |           |
| Dennis           | Drop               | X                  | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         |
| Dighton          | Curb               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   |                | X          | X                 | X               |              |               |           |
| Douglas          | Drop               | X                  | X         |             |                     | X     | X        | X         |                | X                  | X              |              |             | X           |           |                   |                | X          | X                 |                 |              |               | X         |
| Dover            | Drop               | X                  | X         | X           |                     | X     | X        |           | X              | X                  | X              | X            |             | X           | X         |                   |                | X          | X                 | X               |              | X             | X         |
| Dracut           | Curb               | X                  | X         | X           | X                   | X     |          |           |                | X                  | X              | X            | X           | X           | X         |                   |                | X          | X                 | X               |              | X             | X         |
| Dudley           | Drop               | X                  | X         | X           |                     | X     |          | X         |                | X                  | X              |              | X           | X           | X         |                   |                | X          | X                 | X               | X            |               | X         |
| Dunstable        | Drop               | X                  | X         | X           | X                   | X     | X        | X         |                | X                  | X              |              | X           | X           | X         | X                 | X              | X          |                   |                 |              |               | X         |
| Duxbury          | Drop               | X                  | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           |           |                   |                |            |                   |                 |              |               | X         |
| East Bridgewater | Curb               | X                  | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           |           |                   |                | X          |                   |                 |              |               |           |
| East Brookfield  | Curb               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                |            |                   |                 |              |               |           |
| East Longmeadow  | Curb               | X                  | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            |             | X           | X         |                   |                | X          | X                 | X               |              |               |           |
| Eastham          | Drop               | X                  |           |             |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   |                | X          | X                 | X               | X            |               | X         |
| Easthampton      | Drop               | X                  | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   |                | X          | X                 | X               |              |               | X         |
| Easton           | Drop               | X                  | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   |                | X          | X                 | X               |              | X             | X         |
| Edgartown        | Drop               | X                  | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         |
| Egremont         | Drop               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   |                |            |                   |                 |              |               | X         |
| Erving           | Curb               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           |
| Essex            | Drop               | X                  |           | X           |                     | X     | X        |           |                | X                  |                | X            | X           | X           | X         | X                 | X              |            |                   | X               |              | X             | X         |
| Everett          | Curb               | X                  |           | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           |             |           |                   |                |            | X                 |                 |              |               | X         |
| Fairhaven        | Curb               | X                  |           | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         |
| Fall River       | Curb               | X                  |           |             |                     | X     | X        | X         |                | X                  | X              |              | X           |             | X         |                   |                | X          | X                 | X               |              |               |           |
| Falmouth         | Curb               | X                  | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   |                | X          | X                 | X               | X            | X             | X         |
| Fitchburg        | Curb               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           |
| Florida          | Drop               | X                  | X         | X           | X                   | X     |          |           |                | X                  | X              | X            | X           | X           |           |                   |                |            | X                 | X               |              |               | X         |
| Foxborough       | Curb               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   |                | X          | X                 | X               |              |               |           |
| Framingham       | Curb               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         |
| Franklin         | Curb               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              |             | X           |           |                   |                | X          | X                 | X               | X            | X             | X         |
| Freetown         | Drop               | X                  | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              |             | X           | X         |                   |                | X          | X                 | X               |              |               | X         |
| Gardner          | Curb               | X                  | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              |             |             | X         |                   |                | X          | X                 | X               | X            |               | X         |
| Gay Head         | Drop               | X                  | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         |
| Georgetown       | Drop               | X                  |           |             |                     | X     |          |           |                | X                  | X              |              |             | X           |           |                   |                |            | X                 | X               |              |               |           |

| Municipality     | Collection Method* |           |           |             |                     |       |          |           |                |                    |                |              |             |             |           |                   |                |            |                   |                 |              |               |           |          |
|------------------|--------------------|-----------|-----------|-------------|---------------------|-------|----------|-----------|----------------|--------------------|----------------|--------------|-------------|-------------|-----------|-------------------|----------------|------------|-------------------|-----------------|--------------|---------------|-----------|----------|
|                  |                    | Newspaper | Cardboard | Mixed Paper | Wax/Aseptic Cartons | Glass | #1 (PET) | #2 (HDPE) | Other Plastics | Aluminum cans/foil | Steel/Tin cans | Aerosol cans | White Goods | Scrap Metal | Motor Oil | Spent anti-freeze | Auto batteries | Auto tires | Leaves/Yard Waste | Christmas Trees | C & D debris | Surplus paint | Swap Shop | Te1tiles |
| Gill             | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            |             | X           | X         | X                 | X              | X          | X                 | X               | X            |               |           | X        |
| Gloucester       | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            |             | X           |           | X                 | X              | X          | X                 | X               |              | X             |           | X        |
| Goshen           | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              |                    |                | X            | X           |             |           |                   |                | X          |                   | X               | X            |               |           | X        |
| Gosnold          | Curb               | X         | X         |             |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          |                   |                 | X            |               |           |          |
| Grafton          | Drop               | X         | X         | X           |                     | X     |          | X         |                | X                  | X              |              |             | X           |           |                   |                | X          |                   |                 |              |               |           |          |
| Granby           | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X        |
| Granville        | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                |            |                   |                 |              |               |           |          |
| Great Barrington | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 |                | X          |                   |                 |              |               |           |          |
| Greenfield       | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            |               |           | X        |
| Groton           | Drop               | X         | X         | X           | X                   | X     | X        | X         |                | X                  | X              | X            | X           |             |           |                   |                | X          | X                 |                 |              |               |           | X        |
| Groveland        | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           |             | X         | X                 | X              | X          | X                 | X               |              |               |           |          |
| Hadley           | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X        |
| Halifax          | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            |             | X           | X         |                   | X              | X          | X                 | X               | X            | X             | X         | X        |
| Hamilton         | Curb               | X         |           | X           |                     | X     | X        | X         | X              | X                  | X              |              |             | X           |           |                   |                | X          | X                 |                 |              |               |           |          |
| Hampden          | Drop               | X         | X         | X           |                     | X     |          | X         |                | X                  | X              |              | X           | X           |           |                   |                | X          | X                 |                 |              |               |           |          |
| Hancock          | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           |             |           |                   |                | X          |                   | X               |              |               |           |          |
| Hanover          | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             |           | X        |
| Hanson           | Drop               | X         |           |             | X                   | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   | X              |            | X                 |                 |              |               |           | X        |
| Hardwick         | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   | X              | X          |                   | X               | X            | X             | X         | X        |
| Harvard          | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           |             |           |                   |                | X          |                   |                 |              |               |           |          |
| Harwich          | Drop               | X         | X         | X           |                     | X     | X        |           |                | X                  | X              | X            | X           |             |           |                   |                | X          | X                 |                 |              | X             | X         |          |
| Hatfield         | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  |                | X            | X           | X           |           |                   |                | X          | X                 | X               | X            | X             | X         | X        |
| Haverhill        | Curb               | X         | X         | X           |                     | X     |          | X         |                | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 | X               |              | X             |           | X        |
| Hawley           | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   |                | X          | X                 | X               | X            | X             | X         | X        |
| Heath            | Drop               | X         | X         | X           | X                   | X     |          |           |                | X                  | X              |              | X           | X           |           |                   |                | X          |                   |                 | X            |               | X         |          |
| Hingham          | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X        |
| Hinsdale         | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           |             | X         | X                 | X              | X          |                   |                 |              |               |           |          |
| Holbrook         | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             |           |          |
| Holden           | Sub                | X         |           | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 |                 |              |               |           |          |
| Holland          | Sub                |           |           |             |                     |       |          |           |                |                    |                |              |             |             |           |                   |                | X          |                   |                 |              |               |           |          |
| Holliston        | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           |             | X         | X                 | X              | X          | X                 | X               |              | X             |           | X        |
| Holyoke          | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  |                | X            | X           | X           |           | X                 | X              | X          | X                 | X               |              | X             |           | X        |
| Hopedale         | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  |                | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         |          |
| Hopkinton        | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  |                | X            | X           |             |           |                   | X              |            | X                 |                 |              |               |           | X        |
| Hubbardston      | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  |                | X            | X           | X           | X         | X                 | X              | X          |                   | X               |              |               |           | X        |
| Hudson           | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   | X              | X          | X                 |                 |              |               |           |          |
| Hull             | Drop               | X         | X         |             |                     | X     | X        | X         |                |                    |                | X            |             | X           |           |                   |                | X          |                   | X               |              |               |           |          |
| Huntington       | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  |                | X            | X           |             |           |                   |                | X          |                   | X               | X            | X             | X         | X        |
| Ipswich          | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           |           |                   |                | X          | X                 |                 |              |               |           | X        |
| Kingston         | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             |           | X        |
| Lakeville        | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             |           | X        |
| Lancaster        | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         |          |
| Lanesborough     | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  |                |              |             |             |           | X                 | X              |            |                   |                 | X            |               |           |          |
| Lawrence         | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  |                | X            |             |             |           |                   |                | X          | X                 |                 |              |               |           |          |
| Lee              | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  |                |              |             |             |           |                   |                |            | X                 |                 | X            |               |           |          |
| Leicester        | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  |                | X            |             | X           |           | X                 | X              | X          |                   |                 |              |               |           |          |
| Lenox            | Sub                | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            |               |           | X        |
| Leominster       | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  |                | X            | X           | X           | X         |                   | X              | X          | X                 | X               | X            | X             |           | X        |
| Leverett         | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   | X              | X          |                   |                 | X            | X             | X         | X        |
| Lexington        | Curb               | X         | X         | X           | X                   | X     | X        | X         |                | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              |               |           | X        |
| Leyden           | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  |                | X            | X           | X           | X         | X                 | X              | X          |                   |                 | X            |               |           |          |
| Lincoln          | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  |                | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X        |
| Littleton        | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         | X        |
| Longmeadow       | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           |             |           |                   | X              | X          | X                 |                 | X            | X             | X         | X        |
| Lowell           | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           |             |           | X                 | X              | X          | X                 | X               | X            |               |           | X        |



| Municipality     | Collection Method* |           |           |             |                     |       |          |           |                |                    |                |              |             |             |           |                   |                |            |                   |                 |              |               |           |          |                 |
|------------------|--------------------|-----------|-----------|-------------|---------------------|-------|----------|-----------|----------------|--------------------|----------------|--------------|-------------|-------------|-----------|-------------------|----------------|------------|-------------------|-----------------|--------------|---------------|-----------|----------|-----------------|
|                  |                    | Newspaper | Cardboard | Mixed Paper | Wax/Aseptic Cartons | Glass | #1 (PET) | #2 (HDPE) | Other Plastics | Aluminum cans/foil | Steel/Tin cans | Aerosol cans | White Goods | Scrap Metal | Motor Oil | Spent anti-freeze | Auto batteries | Auto tires | Leaves/Yard Waste | Christmas Trees | C & D debris | Surplus paint | Swap Shop | Te1tiles | Other Materials |
| Ludlow           | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  |                | X            | X           | X           |           | X                 | X              | X          | X                 |                 | X            |               |           |          |                 |
| Lunenburg        | Sub                |           |           |             |                     |       |          |           |                |                    |                |              |             |             |           |                   |                |            |                   |                 |              |               |           |          |                 |
| Lynn             | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              |             |             |           |                   |                | X          | X                 |                 |              |               |           |          |                 |
| Lynnfield        | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           | X                 | X              | X          | X                 | X               | X            |               |           | X        |                 |
| Malden           | Curb               | X         |           | X           |                     | X     | X        | X         |                | X                  | X              |              | X           |             |           |                   |                | X          | X                 |                 |              |               |           |          |                 |
| Manchester       | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  |                | X            | X           | X           | X         | X                 |                | X          | X                 |                 |              |               | X         | X        |                 |
| Mansfield        | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           | X                 |                | X          | X                 |                 |              | X             | X         |          |                 |
| Marblehead       | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 | X               |              | X             | X         |          |                 |
| Marion           | Curb               | X         |           |             |                     | X     | X        | X         |                | X                  |                |              | X           | X           |           |                   |                | X          | X                 |                 |              |               |           |          |                 |
| Marlborough      | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 | X               |              | X             |           |          |                 |
| Marshfield       | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  |                | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           |          |                 |
| Mashpee          | Drop               | X         |           |             |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               | X            |               |           | X        |                 |
| Mattapoissett    | Curb               | X         |           | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 | X               |              | X             | X         | X        |                 |
| Maynard          | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           |             |           |                   | X              | X          | X                 | X               | X            |               | X         |          |                 |
| Medfield         | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 | X               |              | X             |           |          |                 |
| Medford          | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          | X                 |                 |              |               |           |          |                 |
| Medway           | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   | X              |            | X                 | X               |              | X             |           |          |                 |
| Melrose          | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 | X               |              | X             |           | X        |                 |
| Mendon           | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              |             | X           |           |                   |                |            | X                 |                 |              |               |           |          |                 |
| Merrimac         | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           | X        |                 |
| Methuen          | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X        |                 |
| Middleborough    | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         | X        |                 |
| Middlefield      | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          |                   | X               | X            | X             | X         | X        |                 |
| Middleton        | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   |                | X          | X                 | X               |              | X             | X         | X        |                 |
| Milford          | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   | X              | X          | X                 | X               |              | X             | X         | X        |                 |
| Millbury         | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   | X              |            | X                 | X               |              |               |           | X        |                 |
| Millis           | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   |                |            | X                 | X               |              | X             | X         |          |                 |
| Millville        | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                |            | X                 | X               |              |               |           |          |                 |
| Milton           | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   | X              | X          | X                 | X               |              |               |           | X        |                 |
| Monroe           | Curb               | X         | X         | X           | X                   | X     |          |           |                | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           | X        |                 |
| Monson           | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   |                | X          |                   |                 |              |               |           |          |                 |
| Montague         | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 | X               | X            |               |           | X        |                 |
| Monterey         | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          |                   |                 | X            |               |           |          |                 |
| Montgomery       | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            |             |             |           |                   |                |            |                   |                 |              |               |           |          |                 |
| Mount Washington | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              |             | X           |           |                   |                |            |                   |                 |              |               |           |          |                 |
| Nahant           | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   |                |            | X                 | X               |              |               |           |          |                 |
| Nantucket        | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             |           |          |                 |
| Natick           | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   | X              |            | X                 | X               |              |               |           |          |                 |
| Needham          | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         | X        |                 |
| New Ashford      | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         | X        |                 |
| New Bedford      | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              |            | X                 | X               |              | X             |           | X        |                 |
| New Braintree    | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   | X              | X          |                   |                 |              | X             | X         | X        |                 |
| New Marlborough  | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          |                   |                 |              |               |           |          |                 |
| New Salem        | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              |             |             | X         | X                 |                |            |                   |                 |              | X             | X         |          |                 |
| Newbury          | Drop               | X         | X         | X           |                     | X     | X        | X         |                |                    | X              |              | X           | X           | X         |                   | X              | X          | X                 | X               |              | X             | X         | X        |                 |
| Newburyport      | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   | X              |            | X                 | X               |              | X             |           | X        |                 |
| Newton           | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         | X        |                 |
| Norfolk          | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              |               |           | X        |                 |
| North Adams      | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                |            | X                 | X               | X            |               |           |          |                 |
| North Andover    | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           |             | X         |                   |                |            | X                 | X               |              |               |           |          |                 |
| North Attleboro  | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   | X              | X          | X                 |                 |              |               |           |          |                 |
| North Brookfield | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X        |                 |
| North Reading    | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            |             |             | X         | X                 | X              | X          | X                 | X               |              | X             |           |          |                 |
| Northampton      | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           | X        |                 |
| Northborough     | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              |             |             | X         | X                 |                | X          | X                 | X               |              | X             |           |          |                 |

| Municipality | Collection Method* | Newspaper | Cardboard | Mixed Paper | Wax/Aseptic Cartons | Glass | #1 (PET) | #2 (HDPE) | Other Plastics | Aluminum cans/foil | Steel/Tin cans | Aerosol cans | White Goods | Scrap Metal | Motor Oil | Spent anti-freeze | Auto batteries | Auto tires | Leaves/Yard Waste | Christmas Trees | C & D debris | Surplus paint | Swap Shop | Te1tiles | Other Materials |
|--------------|--------------------|-----------|-----------|-------------|---------------------|-------|----------|-----------|----------------|--------------------|----------------|--------------|-------------|-------------|-----------|-------------------|----------------|------------|-------------------|-----------------|--------------|---------------|-----------|----------|-----------------|
| Northbridge  | Sub                | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           |             | X         | X                 |                |            | X                 | X               |              | X             |           |          |                 |
| Northfield   | Drop               | X         | X         | X           | X                   | X     |          |           |                | X                  | X              |              | X           | X           |           |                   |                |            | X                 | X               |              |               | X         |          |                 |
| Norton       | Sub                |           |           |             |                     |       |          |           |                |                    |                |              |             |             | X         | X                 |                |            | X                 |                 |              |               |           |          |                 |
| Norwell      | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 |                |            | X                 | X               |              | X             |           |          |                 |
| Norwood      | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         | X        | X               |
| Oak Bluffs   | Drop               |           |           |             |                     |       |          |           |                |                    |                |              |             |             |           |                   |                |            |                   |                 |              |               |           |          |                 |
| Oakham       | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          |                   |                 | X            |               |           | X        | X               |
| Orange       | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X        | X               |
| Orleans      | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 |                 |              | X             |           |          |                 |
| Otis         | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              |            | X                 | X               | X            |               | X         | X        |                 |
| Oxford       | Sub                | X         | X         | X           |                     | X     | X        | X         |                |                    |                |              | X           | X           | X         |                   |                |            | X                 | X               |              |               |           | X        |                 |
| Palmer       | Sub                | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              |             |             |           |                   |                |            |                   |                 |              |               |           |          |                 |
| Paxton       | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X        | X               |
| Peabody      | Curb               | X         | X         | X           | X                   | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   | X              |            | X                 |                 |              |               |           | X        | X               |
| Pelham       | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         | X        |                 |
| Pembroke     | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           |           |                   | X              | X          | X                 |                 |              |               | X         | X        | X               |
| Pepperell    | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          |                   | X               | X            | X             |           |          |                 |
| Peru         | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              |             |             | X         | X                 |                | X          |                   |                 |              |               |           |          |                 |
| Petersham    | Drop               | X         | X         | X           |                     | X     |          |           |                | X                  | X              |              |             | X           |           |                   |                |            |                   |                 |              |               |           |          |                 |
| Phillipston  | Drop               | X         | X         | X           | X                   | X     | X        | X         |                | X                  | X              |              | X           | X           |           |                   |                |            |                   |                 |              |               |           |          |                 |
| Pittsfield   | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              |             |             |           |                   |                |            | X                 | X               |              |               |           |          |                 |
| Plainfield   | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          |                   |                 | X            | X             | X         | X        |                 |
| Plainville   | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   | X              | X          | X                 | X               | X            | X             |           |          |                 |
| Plymouth     | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  |                |              | X           | X           | X         |                   | X              | X          | X                 | X               | X            | X             |           | X        | X               |
| Plympton     | Drop               | X         |           | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   |                | X          |                   | X               |              |               | X         | X        |                 |
| Princeton    | Sub                |           |           |             |                     |       |          |           |                |                    |                |              |             |             |           |                   |                |            |                   |                 |              |               |           |          |                 |
| Provincetown | Both               | X         | X         | X           |                     | X     |          | X         |                | X                  | X              |              | X           | X           | X         | X                 |                |            | X                 |                 |              |               |           |          |                 |
| Quincy       | Curb               | X         | X         | X           | X                   | X     | X        | X         |                | X                  | X              | X            | X           |             | X         | X                 | X              | X          | X                 | X               | X            | X             |           |          | X               |
| Randolph     | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           |          |                 |
| Raynham      | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 |                 |              |               |           | X        |                 |
| Reading      | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           |             | X         | X                 | X              | X          | X                 | X               |              | X             |           | X        |                 |
| Rehoboth     | Drop               | X         | X         |             |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         |                   | X              | X          | X                 | X               |              | X             | X         | X        | X               |
| Revere       | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          | X                 | X               |              | X             |           |          | X               |
| Richmond     | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          |                   |                 |              |               |           |          |                 |
| Rochester    | Curb               | X         | X         | X           |                     | X     | X        | X         |                |                    |                |              |             |             |           |                   |                |            |                   | X               |              |               |           |          |                 |
| Rockland     | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 |                 |              | X             |           |          |                 |
| Rockport     | Drop               | X         | X         | X           | X                   | X     | X        | X         |                | X                  | X              | X            |             | X           | X         |                   |                |            | X                 | X               |              |               | X         | X        | X               |
| Rowe         | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          |                   | X               | X            | X             | X         |          | X               |
| Rowley       | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              |             |             |           |                   |                |            |                   |                 |              |               |           |          |                 |
| Royalston    | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               | X            |               | X         | X        |                 |
| Russell      | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   |                | X          | X                 | X               |              |               |           |          |                 |
| Rutland      | Drop               |           |           |             |                     |       |          |           |                |                    |                |              |             |             |           |                   |                |            |                   |                 |              |               |           |          |                 |
| Salem        | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           | X        |                 |
| Salisbury    | Curb               | X         |           | X           |                     | X     | X        | X         |                | X                  | X              |              | X           |             | X         |                   |                |            | X                 | X               |              |               |           |          |                 |
| Sandisfield  | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         |                   | X              | X          |                   |                 | X            |               |           |          |                 |
| Sandwich     | Drop               | X         |           | X           |                     | X     |          | X         |                | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 |                 |              |               | X         |          |                 |
| Saugus       | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           | X        |                 |
| Savoy        | Drop               |           |           |             |                     |       |          |           |                |                    |                |              |             |             |           |                   |                |            |                   |                 |              |               |           |          |                 |
| Scituate     | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  |                |              | X           | X           | X         | X                 | X              | X          | X                 |                 |              |               | X         | X        |                 |
| Seekonk      | Curb               | X         | X         | X           |                     | X     |          | X         |                | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           | X        |                 |
| Sharon       | Curb               | X         | X         | X           | X                   | X     | X        | X         |                | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           | X        |                 |
| Sheffield    | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 |                 |              | X             |           | X        |                 |
| Shelburne    | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         | X        |                 |
| Sherborn     | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   |                |            |                   |                 |              |               |           | X        |                 |
| Shirley      | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           |             |           |                   |                |            | X                 |                 |              |               |           |          |                 |



| Municipality     | Collection Method* |           |           |             |                     |       |          |           |                |                    |                |              |             |             |           |                   |                |            |                   |                 |              |               |           |          |                 |
|------------------|--------------------|-----------|-----------|-------------|---------------------|-------|----------|-----------|----------------|--------------------|----------------|--------------|-------------|-------------|-----------|-------------------|----------------|------------|-------------------|-----------------|--------------|---------------|-----------|----------|-----------------|
|                  |                    | Newspaper | Cardboard | Mixed Paper | Wax/Aseptic Cartons | Glass | #1 (PET) | #2 (HDPE) | Other Plastics | Aluminum cans/foil | Steel/Tin cans | Aerosol cans | White Goods | Scrap Metal | Motor Oil | Spent anti-freeze | Auto batteries | Auto tires | Leaves/Yard Waste | Christmas Trees | C & D debris | Surplus paint | Swap Shop | Te1tiles | Other Materials |
| Shrewsbury       | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            |             | X           |           |                   |                | X          |                   |                 |              |               |           | X        |                 |
| Shutesbury       | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   |                |            | X                 |                 |              |               |           |          |                 |
| Somerset         | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         |                   | X              | X          |                   |                 | X            | X             | X         |          |                 |
| Somerville       | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   | X              | X          |                   |                 |              |               |           |          |                 |
| South Hadley     | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   | X              | X          | X                 |                 | X            | X             | X         | X        | X               |
| Southampton      | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              |            | X                 | X               |              | X             |           | X        |                 |
| Southborough     | Drop               | X         |           |             |                     | X     |          | X         |                | X                  | X              |              | X           | X           |           |                   |                | X          | X                 |                 |              | X             | X         |          |                 |
| Southbridge      | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 | X               | X            | X             |           |          |                 |
| Southwick        | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 |                 |              | X             |           |          |                 |
| Spencer          | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              | X          |                   | X               | X            |               | X         | X        |                 |
| Springfield      | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            |               |           | X        |                 |
| Sterling         | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         | X        | X               |
| Stockbridge      | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              | X          |                   | X               | X            |               | X         |          |                 |
| Stoneham         | Curb               | X         |           | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           | X        |                 |
| Stoughton        | Curb               | X         |           |             |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   |                |            | X                 | X               |              |               |           | X        |                 |
| Stow             | Sub                | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           |           |                   |                |            |                   |                 |              |               |           |          |                 |
| Sturbridge       | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            |             | X           | X         | X                 | X              | X          | X                 | X               | X            |               |           | X        |                 |
| Sudbury          | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   | X              | X          | X                 | X               |              |               | X         | X        |                 |
| Sunderland       | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          |                   |                 |              | X             |           |          |                 |
| Sutton           | Drop               | X         | X         | X           |                     | X     | X        | X         | X              |                    | X              |              | X           | X           | X         |                   |                |            |                   | X               |              |               |           |          |                 |
| Swampscott       | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         |                   |                |            | X                 | X               |              |               |           |          |                 |
| Swansea          | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           | X           |           |                   |                |            | X                 | X               |              |               |           |          |                 |
| Taunton          | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   | X              | X          | X                 | X               |              | X             | X         | X        |                 |
| Templeton        | Sub                | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          | X                 |                 |              |               |           |          |                 |
| Tewksbury        | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           |             | X         | X                 | X              | X          | X                 | X               |              | X             |           |          |                 |
| Tisbury          | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          | X                 | X               |              |               |           | X        |                 |
| Tolland          | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   | X              | X          |                   |                 |              |               | X         |          |                 |
| Topsfield        | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              |             |             |           |                   |                | X          | X                 | X               |              |               | X         | X        |                 |
| Townsend         | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 |                 |              | X             |           | X        |                 |
| Truro            | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         | X        |                 |
| Tyngsborough     | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            |             |             | X         | X                 | X              |            | X                 |                 |              | X             |           |          |                 |
| Tyringham        | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   |                |            |                   |                 |              |               | X         | X        |                 |
| Upton            | Drop               | X         |           |             |                     | X     |          |           |                | X                  | X              |              | X           | X           |           |                   |                |            | X                 |                 |              |               |           | X        |                 |
| Uxbridge         | Sub                | X         | X         | X           |                     | X     |          |           |                | X                  | X              |              | X           | X           |           |                   | X              | X          | X                 | X               |              |               |           | X        | X               |
| Wakefield        | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   |                |            | X                 | X               |              |               |           |          |                 |
| Wales            | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             |           | X        |                 |
| Walpole          | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            |             |             | X         | X                 | X              | X          | X                 | X               |              | X             |           | X        |                 |
| Waltham          | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            |             |             | X         | X                 | X              |            | X                 | X               |              | X             |           |          |                 |
| Ware             | Drop               |           |           |             |                     |       |          |           |                |                    |                |              |             |             |           |                   |                |            |                   |                 |              |               |           |          |                 |
| Wareham          | Curb               | X         |           |             |                     | X     | X        | X         | X              | X                  | X              |              | X           |             |           |                   | X              | X          | X                 |                 |              | X             |           |          |                 |
| Warren           | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   | X              | X          | X                 | X               |              |               |           | X        |                 |
| Warwick          | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          |                   |                 | X            |               | X         |          |                 |
| Washington       | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          |                   |                 |              |               |           | X        |                 |
| Watertown        | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             |           | X        |                 |
| Wayland          | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X        |                 |
| Webster          | Drop               | X         | X         | X           | X                   | X     | X        |           |                | X                  | X              | X            | X           | X           |           |                   | X              | X          | X                 | X               |              | X             | X         | X        |                 |
| Wellesley        | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   | X              | X          | X                 | X               | X            | X             | X         | X        |                 |
| Wellfleet        | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X        |                 |
| Wendell          | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              |             |             | X         | X                 |                |            |                   |                 |              | X             | X         |          |                 |
| Wenham           | Curb               | X         |           | X           |                     | X     | X        | X         | X              | X                  | X              |              |             | X           |           |                   |                |            |                   |                 |              |               |           |          |                 |
| West Boylston    | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              |            | X                 | X               |              | X             |           |          |                 |
| West Bridgewater | Drop               | X         | X         |             |                     | X     | X        | X         | X              | X                  | X              |              | X           |             |           |                   |                |            |                   |                 |              |               | X         |          |                 |
| West Brookfield  | Drop               |           |           |             |                     |       |          |           |                |                    |                |              |             |             |           |                   |                |            |                   |                 |              |               |           |          |                 |
| West Newbury     | Curb               | X         |           | X           |                     | X     | X        |           |                | X                  | X              |              |             | X           |           |                   |                |            |                   | X               |              |               |           |          |                 |
| West Springfield | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          | X                 | X               | X            |               |           |          |                 |

| Municipality        | Collection Method* | Newspaper | Cardboard | Mixed Paper | Wax/Aseptic Cartons | Glass | #1 (PET) | #2 (HDPE) | Other Plastics | Aluminum cans/foil | Steel/Tin cans | Aerosol cans | White Goods | Scrap Metal | Motor Oil | Spent anti-freeze | Auto batteries | Auto tires | Leaves/Yard Waste | Christmas Trees | C & D debris | Surplus paint | Swap Shop | Te1tiles | Other Materials |
|---------------------|--------------------|-----------|-----------|-------------|---------------------|-------|----------|-----------|----------------|--------------------|----------------|--------------|-------------|-------------|-----------|-------------------|----------------|------------|-------------------|-----------------|--------------|---------------|-----------|----------|-----------------|
| West Stockbridge    | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   | X              | X          |                   |                 | X            |               |           |          |                 |
| West Tisbury        | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X        |                 |
| Westborough         | Drop               | X         | X         | X           | X                   | X     | X        | X         |                | X                  | X              | X            | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             | X         | X        |                 |
| Westfield           | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               |              | X             | X         |          | X               |
| Westford            | Curb               | X         | X         | X           | X                   | X     | X        | X         |                | X                  | X              |              | X           |             | X         | X                 |                |            | X                 | X               |              |               |           | X        |                 |
| Westhampton         | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                | X          |                   |                 | X            | X             |           | X        |                 |
| Westminster         | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 | X               | X            | X             |           | X        |                 |
| Weston              | Drop               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   |                |            | X                 |                 |              |               |           |          |                 |
| Westport            | Drop               | X         | X         |             |                     | X     | X        | X         |                | X                  | X              |              |             | X           | X         |                   | X              | X          | X                 | X               | X            |               |           | X        |                 |
| Westwood            | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           | X           |           |                   |                |            | X                 | X               |              |               |           |          |                 |
| Weymouth            | Curb               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           |             | X         |                   | X              | X          | X                 |                 |              | X             |           |          |                 |
| Whately             | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              |             |             | X         | X                 | X              |            |                   |                 |              | X             |           |          | X               |
| Whitman             | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           |             |           |                   |                | X          | X                 |                 |              |               |           |          |                 |
| Wilbraham           | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           | X           |           |                   | X              | X          | X                 | X               |              | X             |           |          | X               |
| Williamsburg        | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           | X                 | X              | X          |                   |                 | X            | X             | X         | X        |                 |
| Williamstown        | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   |                |            | X                 | X               | X            | X             | X         | X        |                 |
| Wilmington          | Curb               | X         | X         | X           | X                   | X     | X        | X         |                | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 |                 |              | X             |           |          |                 |
| Winchendon          | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   |                | X          | X                 |                 |              | X             |           |          |                 |
| Winchester          | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              | X            | X           | X           | X         |                   | X              |            | X                 | X               | X            |               | X         | X        |                 |
| Windsor             | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         | X                 | X              | X          | X                 | X               | X            | X             |           |          |                 |
| Winthrop            | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            |             | X           |           |                   |                |            | X                 | X               |              |               |           |          |                 |
| Woburn              | Curb               | X         | X         | X           |                     | X     | X        | X         | X              | X                  | X              |              | X           |             |           |                   | X              | X          | X                 | X               |              |               |           |          |                 |
| Worcester           | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           |           | X                 | X              | X          | X                 | X               |              | X             |           | X        |                 |
| Worthington         | Drop               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              |              | X           | X           | X         |                   | X              | X          |                   |                 | X            | X             | X         | X        |                 |
| Wrentham            | Curb               | X         | X         | X           | X                   | X     | X        | X         | X              | X                  | X              | X            | X           |             |           |                   |                | X          | X                 | X               |              |               |           |          |                 |
| Yarmouth            | Drop               | X         | X         | X           |                     | X     | X        | X         |                | X                  | X              |              | X           | X           | X         |                   | X              | X          | X                 |                 |              |               |           |          |                 |
| # of Municipalities |                    | 339       | 311       | 321         | 164                 | 340   | 317      | 320       | 225            | 330                | 329            | 119          | 297         | 274         | 220       | 129               | 204            | 223        | 257               | 229             | 89           | 163           | 108       | 183      | 38              |

\* Collection Method: Curb - Curbside Collection; Drop - Drop-off Center; Sub - Private Subscription Service





## APPENDIX E

### Landfill Capacity

#### Massachusetts Landfills, Waste Disposed in 1998, Approved Capacity 2000-2010\*

| Municipality |        | Disposed '98 |     | Liner         | CloseDate   | Exclusive MSW/Non-MSW |         | Approved Capacity in Tons/Year |         |         |         |         |         |         |         |         |  |
|--------------|--------|--------------|-----|---------------|-------------|-----------------------|---------|--------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|--|
| ID           | Region | Status       | Own | Projected TPY | %MSW        | 2000                  | 2001    | 2002                           | 2003    | 2004    | 2005    | 2006    | 2007    | 2008    | 2009    | 2010    |  |
| AMHERST      |        | 19,484       | Y   | 11/01/2002    | No No       | 30,888                | 30,888  | 25,811                         | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |  |
| SL0008.002   | W      | Active       | M   | 30,888        | 100%        |                       |         |                                |         |         |         |         |         |         |         |         |  |
| BARRE        |        | 53,686       | Y   | 12/31/2006    | Yes No      | 93,600                | 93,600  | 93,600                         | 93,600  | 93,600  | 93,600  | 93,600  | 0       | 0       | 0       | 0       |  |
| SL0021.002   | C      | Active       | P   | 93,600        | 17%         |                       |         |                                |         |         |         |         |         |         |         |         |  |
| BOURNE       |        | 90,450       | Y   | 12/31/2001    | n/a No      | 146,000               | 146,000 | 0                              | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |  |
| SL0036.004   | S      | Active       | M   | 146,000       | 0%          |                       |         |                                |         |         |         |         |         |         |         |         |  |
| CHICOPEE     |        | 182,500      | Y   | 01/31/2002    | No No       | 182,500               | 182,500 | 15,500                         | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |  |
| SL0061.002   | W      | Active       | P   | 182,500       | 100%        |                       |         |                                |         |         |         |         |         |         |         |         |  |
| CHILMARK     |        | 2,050        | N   | 12/31/2003    | n/a No      | 2,014                 | 2,014   | 2,014                          | 2,014   | 0       | 0       | 0       | 0       | 0       | 0       | 0       |  |
| SL0062.001   | S      | Active       | M   | 2,014         | 0%          |                       |         |                                |         |         |         |         |         |         |         |         |  |
| DARTMOUTH    |        | 114,827      | Y   | 12/31/2016    | Yes** Yes** | 115,000               | 115,000 | 115,000                        | 115,000 | 115,000 | 115,000 | 115,000 | 115,000 | 115,000 | 115,000 | 115,000 |  |
| SL0072.003   | S      | Active       | M   | 115,000       | 100%        |                       |         |                                |         |         |         |         |         |         |         |         |  |
| FALL RIVER   |        | 430,247      | Y   | 12/31/2004    | No No       | 468,000               | 468,000 | 468,000                        | 468,000 | 468,000 | 0       | 0       | 0       | 0       | 0       | 0       |  |
| SL0095.002   | S      | Active       | P   | 468,000       | 73%         |                       |         |                                |         |         |         |         |         |         |         |         |  |
| GARDNER      |        | 93,325       | Y   | 07/31/2005    | Yes No      | 37,875                | 90,900  | 90,900                         | 90,900  | 90,900  | 52,797  | 0       | 0       | 0       | 0       | 0       |  |
| SL0103.002   | C      | Inactive+    | M   | 90,900        | 17%         |                       |         |                                |         |         |         |         |         |         |         |         |  |
| GRANBY       |        | 120,936      | Y   | 01/31/2004    | Yes No      | 146,000               | 146,000 | 146,000                        | 146,000 | 12,400  | 0       | 0       | 0       | 0       | 0       | 0       |  |
| SL0111.001   | W      | Active       | P   | 146,000       | 13%         |                       |         |                                |         |         |         |         |         |         |         |         |  |
| HARDWICK     |        | 37,625       | Y   | 12/31/2000    | Yes No      | 47,928                | 0       | 0                              | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |  |
| SL0124.001   | C      | Active       | P   | 47,928        | 7%          |                       |         |                                |         |         |         |         |         |         |         |         |  |
| HINGHAM      |        | 11,200       | N   | 02/06/2000    | Yes Yes     | 983                   | 0       | 0                              | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |  |
| SL0131.001   | N      | Inactive     | M   | 9,700         | 100%        |                       |         |                                |         |         |         |         |         |         |         |         |  |
| HULL         |        | 1,376        | Y   | 05/01/2006    | Yes Yes     | 683                   | 683     | 683                            | 683     | 683     | 683     | 226     | 0       | 0       | 0       | 0       |  |
| SL0142.002   | N      | Active       | M   | 683           | 22%         |                       |         |                                |         |         |         |         |         |         |         |         |  |



| Municipality  | ID | Region | Disposed '98 |     | Liner | CloseDate     | Exclusive MSW/Non-MSW |  | Approved Capacity in Tons/Year |         |         |         |         |         |         |         |         |         |         |
|---------------|----|--------|--------------|-----|-------|---------------|-----------------------|--|--------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|               |    |        | Status       | Own |       | Projected TPY | %MSW                  |  | 2000                           | 2001    | 2002    | 2003    | 2004    | 2005    | 2006    | 2007    | 2008    | 2009    | 2010    |
| MARSHFIELD    |    |        | 18,514       | N   |       | 06/30/2000    | Yes No                |  | 15,402                         | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
| SL0171.004    | S  |        | Active       | M   |       | 30,888        | 51%                   |  |                                |         |         |         |         |         |         |         |         |         |         |
| MIDDLEBOROUGH |    |        | 11,243       | Y   |       | 06/30/2001    | Yes Yes               |  | 9,620                          | 4,770   | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
| SL0182.002    | S  |        | Active       | M   |       | 9,620         | 100%                  |  |                                |         |         |         |         |         |         |         |         |         |         |
| NANTUCKET     |    |        | 22,037       | N   |       | 12/31/2015    | Yes Yes               |  | 7,000                          | 7,000   | 7,000   | 7,000   | 7,000   | 7,000   | 7,000   | 7,000   | 7,000   | 7,000   | 7,000   |
| SL0197.001    | S  |        | Active       | M   |       | 7,000         | 0%                    |  |                                |         |         |         |         |         |         |         |         |         |         |
| NEWBURY       |    |        | 3,831        | Y   |       | 12/31/2013    | Yes Yes               |  | 4,494                          | 4,494   | 4,494   | 4,494   | 4,494   | 4,494   | 4,494   | 4,494   | 4,494   | 4,494   | 4,494   |
| SL0205.002    | N  |        | Active       | M   |       | 4,494         | 100%                  |  |                                |         |         |         |         |         |         |         |         |         |         |
| NORTHAMPTON   |    |        | 41,942       | Y   |       | 01/31/2002    | No No                 |  | 50,000                         | 50,000  | 4,247   | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
| SL0214.001    | W  |        | Active       | M   |       | 50,000        | 100%                  |  |                                |         |         |         |         |         |         |         |         |         |         |
| RAYNHAM       |    |        | 26,420       | N   |       | 06/30/2000    | Yes No                |  | 62,229                         | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
| SL0245.001    | S  |        | Active       | M   |       | 124,800       | 25%                   |  |                                |         |         |         |         |         |         |         |         |         |         |
| SOUTHBRIDGE   |    |        | 76,827       | Y   |       | 06/30/2019    | Yes No                |  | 180,960                        | 180,960 | 180,960 | 180,960 | 180,960 | 180,960 | 180,960 | 180,960 | 180,960 | 180,960 | 180,960 |
| SL0278.002    | C  |        | Active       | M   |       | 180,960       | 14%                   |  |                                |         |         |         |         |         |         |         |         |         |         |
| STURBRIDGE    |    |        | 1,382        | Y   |       | 12/31/2016    | Yes Yes               |  | 569                            | 569     | 569     | 569     | 569     | 569     | 569     | 569     | 569     | 569     | 569     |
| SL0287.001    | C  |        | Active       | M   |       | 569           | 100%                  |  |                                |         |         |         |         |         |         |         |         |         |         |
| TAUNTON       |    |        | 53,343       | Y   |       | 12/31/2007    | Yes No                |  | 88,920                         | 88,920  | 88,920  | 88,920  | 88,920  | 88,920  | 88,920  | 88,920  | 0       | 0       | 0       |
| SL0293.002    | S  |        | Active       | M   |       | 88,920        | 13%                   |  |                                |         |         |         |         |         |         |         |         |         |         |
| TOWNSEND      |    |        | 4,820        | Y   |       | 04/15/2000    | Yes Yes               |  | 1,568                          | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
| SL0299.002    | C  |        | Active       | M   |       | 5,400         | 100%                  |  |                                |         |         |         |         |         |         |         |         |         |         |
| WARREN        |    |        | 1,000        | Y   |       | 12/31/2005    | Yes Yes               |  | 2,000                          | 2,000   | 2,000   | 2,000   | 2,000   | 2,000   | 0       | 0       | 0       | 0       | 0       |
| SL0311.001    | C  |        | Active       | M   |       | 2,000         | 100%                  |  |                                |         |         |         |         |         |         |         |         |         |         |
| WAYLAND       |    |        | 2,371        | Y   |       | 12/31/2005    | Yes Yes               |  | 2,321                          | 2,321   | 2,321   | 2,321   | 2,321   | 2,321   | 0       | 0       | 0       | 0       | 0       |
| SL0315.004    | N  |        | Active       | M   |       | 2,321         | 100%                  |  |                                |         |         |         |         |         |         |         |         |         |         |
| WESTMINSTER   |    |        | 155,372      | Y   |       | 06/30/2002    | No No                 |  | 156,000                        | 156,000 | 77,359  | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
| SL0332.001    | C  |        | Active       | M   |       | 156,000       | 100%                  |  |                                |         |         |         |         |         |         |         |         |         |         |
| WORCESTER     |    |        | 12,500       | N   |       | 09/30/2000    | n/a Yes               |  | 11,711                         | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
| SL0348.007    | C  |        | Active       | M   |       | 15,600        | 0%                    |  |                                |         |         |         |         |         |         |         |         |         |         |

| Municipality | Disposed '98 | Liner  | CloseDate | Exclusive MSW/Non-MSW | Approved Capacity in Tons/Year |           |           |           |           |           |         |         |         |         |         |         |
|--------------|--------------|--------|-----------|-----------------------|--------------------------------|-----------|-----------|-----------|-----------|-----------|---------|---------|---------|---------|---------|---------|
| ID           | Region       | Status | Own       | Projected TPY         | %MSW                           | 2000      | 2001      | 2002      | 2003      | 2004      | 2005    | 2006    | 2007    | 2008    | 2009    | 2010    |
|              |              |        |           |                       |                                | 1,864,265 | 1,772,619 | 1,325,377 | 1,202,461 | 1,066,847 | 548,344 | 490,769 | 396,943 | 308,023 | 308,023 | 308,023 |

**\* Column Heading Definitions**

Region - (C)entral, (N)ortheast, (S)outheast, (W)estern

Status - Active, currently operating; Inactive, not operating not capped; Closed not operating and capped.

Own - ownership of the landfill is either (M)unicipal or (P)ivate

Exclusive MSW / NonMSW - Accepts MSW exclusively from the municipality that the landfill is located in (Yes), accepts MSW from any source (No).

Liner - landfill operates a lined cell (Yes), does not operate a lined cell (No)

1998 Disposed - tons of waste landfilled in 1998

Close Date - estimated date to cease landfilling, based on a permit, consent order, threat classification, or remaining capacity.

Projected TPY - annual tonnage (Tons Per Year) a landfill can dispose of based on a permit, consent order, or historic precedent.

Percent MSW - percent of annual tonnage that can be used for MSW disposal based on permit, consent order, or historic precedent.

Approved Capacity 2000-2010 - estimated future capacity for each landfill as a function of Projected TPY and Close Date.

\*\* Crapo Hill Landfill in Dartmouth serves only the Town of Dartmouth and the City of New Bedford.

+ Gardner is scheduled to re-open August 2000 as a residual landfill





non-responding processors by multiplying the number of employees at each facility (using information obtained from InfoUSA) by productivity indices (developed in a study done by Research International/Cambridge in 1998).

### *C&D Processors Survey*

DEP performed a telephone survey of all known companies that processed construction and demolition (C&D) debris for reuse. The companies were surveyed for information on the type and amount of material processed, and the results were used to estimate the C&D diversion rate. DEP attempted to contact all the processors that handle C&D waste. For quantities handled by known processors that did not respond, numbers from the last survey performed in 1995 were carried forward.

### *Bottle Bill Tonnage*

Bottle bill recycling results are credited toward the residential recycling rate. Container recovery (i.e., deposit redemption) rates were obtained from the Massachusetts Department of Revenue for 1998. DEP estimates the recycled tonnage using trade association data on both material composition (glass, aluminum, plastic, etc) of the beverage containers recovered and average unit weights for different container types. Composition percentages were adjusted based on information provided by deposit container collection companies to reflect the specific conditions in Massachusetts.

## **Data Calculations**

The following formulas and definitions are used to estimate quantities in Table 3-1, Solid Waste Generation and Management, 1994 – 1998. The terms, emphasized in bold type, are presented in the same order in which they appear in the table. Also, completely lower case terms are not included in the table but are calculated in the data analyzed.

**Total Generation** = Disposal + Diversion + Exports - Imports

**Exports** are estimated using data from Annual Facility Reports and a survey of other states

**MSW Generation** = MSW Disposed + MSW Diverted + MSW Exported - MSW Imported

**Residential Generation** = Residential Recycling + Residential Composting + Residential On-site Composting + Bottle Bill + MSW Disposed.

**Commercial Generation** = MSW Generation - Residential Generation

**Non-MSW Generation** = C&D + Other Generation

**C&D Generation** = C&D Disposed + C&D Diverted + C&D exported – C&D imported

**Other (non-MSW) Generation** = Other Disposed + Other diverted + Other exported – Other imported



**Total Management** = Diversion + Disposal

**Imports** are estimated using data from Annual Facility Reports and a survey of other states

**Diversion** = MSW Diversion + Non-MSW Diversion

**MSW Diversion** = Residential Recycling + Commercial Recycling + Residential Composting + Residential On-site Composting + Commercial Composting

**Residential Recycling** is estimated using municipal recycling survey data plus bottle bill data.

**Commercial Recycling** = MSW Recycling (estimated using commercial processors survey and bottle bill data) - Residential Recycling

**Residential Composting** is estimated using the municipal recycling survey data.

**Residential On-Site Composting** is estimated using the *Residential Organic Waste Management Study* and includes yard waste, food waste and paper waste.

**Commercial Composting** is estimated using composting facility report data – Residential Composting + DFA estimates.

**Non-MSW Diversion** = C&D diversion

**C&D diversion** is estimated using data from the C&D processors survey

**Disposal** = Landfill Disposal + Combustion Disposal

**Landfill Disposal** = MSW Disposal + C&D Disposal + Other Disposal

**MSW Disposal** is estimated using data from Annual Facility Reports

**C&D Disposal** is estimated using data from Annual Facility Reports

**Other Disposal** is estimated using data from Annual Facility Reports, and represents all non-MSW disposal other than C&D (e.g., contaminated media, recycling residues, industrial waste, street sweepings, etc.)

**Combustion** = MSW Combustion + non-MSW Combustion

**MSW Combustion** is estimated using data from Annual Facility Reports

**Non-MSW Combustion** is estimated using data from Annual Facility Reports

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## Methodology Improvements

DEP made the following key improvements in data collection and analysis for 1998 data, and, where possible, applied these improvements to 1997 data:

- Updated commercial recycling processor survey by:
  - Reducing recycling processors list from approximately 120 firms to approximately 85 to avoid double counting. (Some of the companies listed collected materials and then transferred them to other processors).
  - Directly surveying larger processors.
  - Extrapolating recycling tonnage for smaller processors. DEP used updated recycling employment-to-productivity indices (developed by Research International/Cambridge) and using updated employment information from InfoUSA to estimate tonnage.
- Updated recycled textiles tonnage by telephone survey
- Updated C&D processors surveys.
- Updated on-site composting information by conducting the *Residential Organic Waste Management Study*.
- Improved off-site composting estimates by assigning tonnage to non-reporting facilities based on responding facilities.
- Differentiated backyard composting from off-site estimates.
- Excluded from disposal tonnage total metals recovered from incinerators to avoid double counting. These materials will only be counted as recyclables.
- Removed an assumption used since 1995 that an additional 200,000 tons of waste is imported annually into Massachusetts but not accounted for. This 200,000 tons of additional import assumption artificially decreased generation rates calculated in the past.
- Removed an assumption used since 1995 that 200,000 tons of reported MSW disposed in landfills is actually C&D misclassified as MSW.





## APPENDIX F

### Combustion Capacity

#### Massachusetts Combustion Facilities

#### 1998 Waste Accepted and Projected Capacity (per year for years 1999-2010) in Tons

| ID             | Type <sup>1</sup> | Municipality  | Facility Name                    | Status   | Projected Waste Accepted | Waste Accepted <sup>2</sup> | Bypass        | Pre-burn metal recovery | Pre-burn nonmetal recovery | Burned <sup>2</sup> | Post-burn metal recovery |
|----------------|-------------------|---------------|----------------------------------|----------|--------------------------|-----------------------------|---------------|-------------------------|----------------------------|---------------------|--------------------------|
| RR0005.005     | MB                | AGAWAM        | Springfield Resource Recovery    | Active   | 115,000                  | 123,338                     | 6,238         | 0                       | 0                          | 116,977             | 1,782                    |
| MI0095.006     | MI                | FALL RIVER    | Fall River Municipal Incinerator | Inactive | 0                        | 46,534                      | 878           | 0                       | 0                          | 46,534              | 0                        |
| RR0128.008     | MB                | HAVERHILL     | Ogden Martin Systems/Haverhill   | Active   | 526,000                  | 532,263                     | 152           | 342                     | 0                          | 532,604             | 6,837                    |
| RR0149.007     | RD                | LAWRENCE      | Ogden Martin Systems/Lawrence    | Inactive | 0                        | 104,874                     | 5,490         | 5,923                   | 0                          | 91,498              | 0                        |
| RR0186.005     | MB                | MILLBURY      | Wheelabrator Millbury            | Active   | 472,000                  | 473,718                     | 0             | 140                     | 0                          | 481,279             | 9,275                    |
| RR0210.001     | MB                | NORTH ANDOVER | Massachusetts Refusetech Inc     | Active   | 395,000                  | 406,329                     | 0             | 0                       | 0                          | 405,933             | 10,496                   |
| RR0236.005     | MB                | PITTSFIELD    | Energy Answers Corp Pittsfield   | Active   | 70,000                   | 73,879                      | 3,336         | 0                       | 0                          | 70,260              | 101                      |
| RR0250.002     | RD                | ROCHESTER     | SEMASS Resource Recovery         | Active   | 975,000                  | 1,055,979                   | 32,013        | 22,041                  | 53                         | 1,001,025           | 26,353                   |
| RR0262.006     | MB                | SAUGUS        | Wheelabrator RESCO               | Active   | 448,000                  | 459,006                     | 0             | 0                       | 0                          | 460,395             | 12,750                   |
| <b>TOTALS:</b> |                   |               |                                  |          | <b>3,001,000</b>         | <b>3,275,920</b>            | <b>48,107</b> | <b>28,446</b>           | <b>175</b>                 | <b>3,206,505</b>    | <b>67,594</b>            |

<sup>1</sup> Ash generation is related to the type of combustion process; Refuse Derived Fuel (RD) leaves 16% of original waste as ash, Mass Burn (MB) 25% as ash, and Municipal Incinerators (MI) also 25% as ash.

<sup>2</sup>Discrepancies between Waste Accepted and Burned are a result of Bypass, Pre-burn recovery, and waste on the tipping floor at 12:01 AM on January 1, 1998







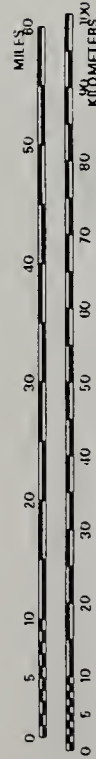
Bureau of West Virginia  
EXP. 1946



This map shows ONLY active Landfills (circle) and Combustion Facilities (square) expected to operate through the end of the year 2000. Size reflects projected tonnage (tons per year).

- 
- | Landfill Type        | Capacity (TPY) |
|----------------------|----------------|
| 150 TPY landfill     | 150            |
| 10,000 TPY landfill  | 10,000         |
| 50,000 TPY landfill  | 50,000         |
| 200,000 TPY landfill | 200,000        |

— DEP Regional Boundary  
— Community Boundary

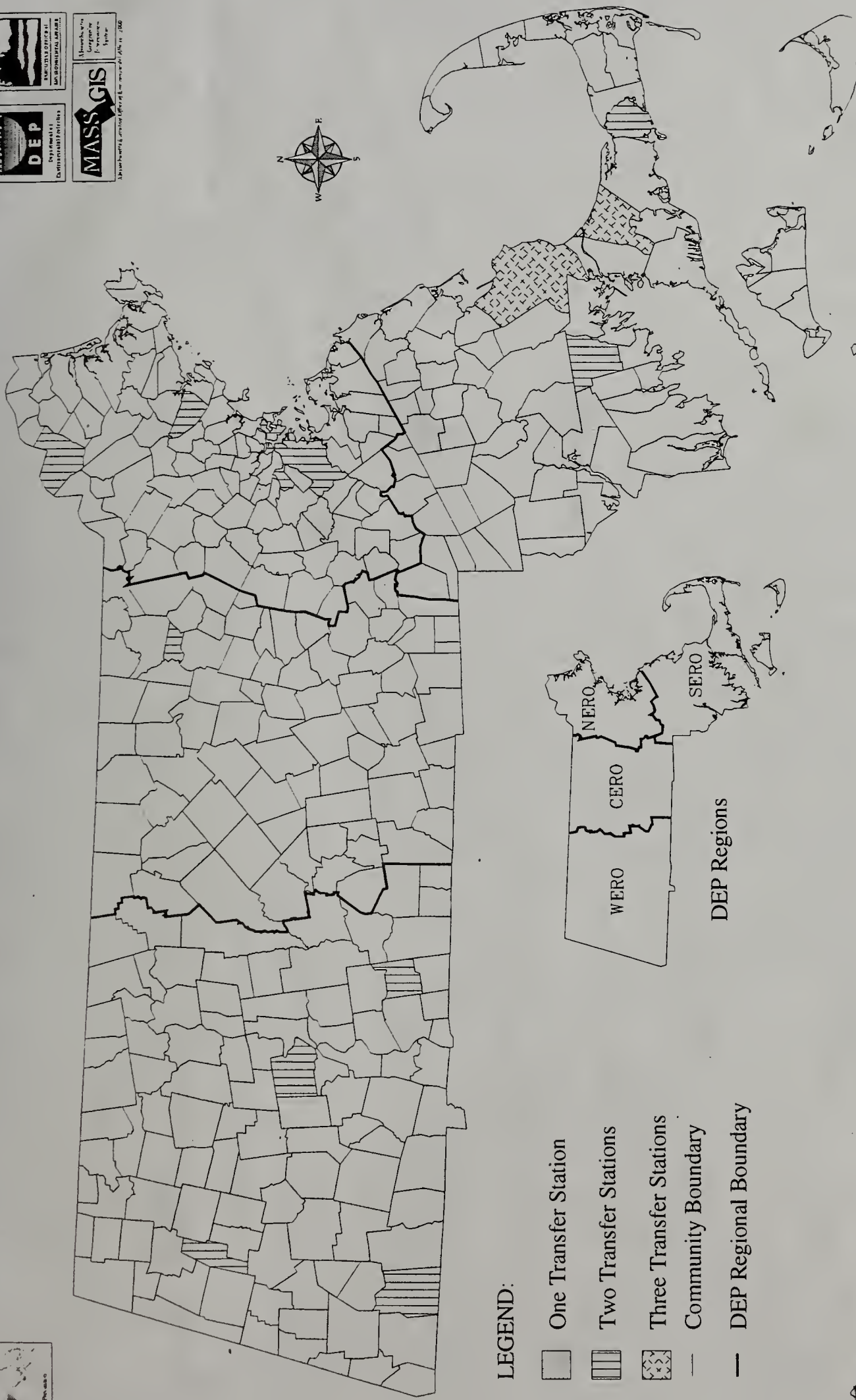
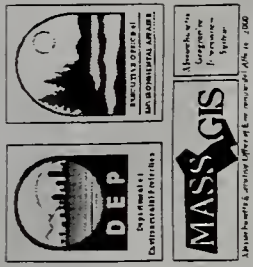






# APPENDIX H:

## Active Transfer Stations in Massachusetts in 2000



### LEGEND:

- One Transfer Station
- Two Transfer Stations
- Three Transfer Stations
- Community Boundary
- DEP Regional Boundary





